A CHILTON PUBLICATION

# the Iron Age

E NATIONAL METALWORKING WEEKLY

October 1, 1953

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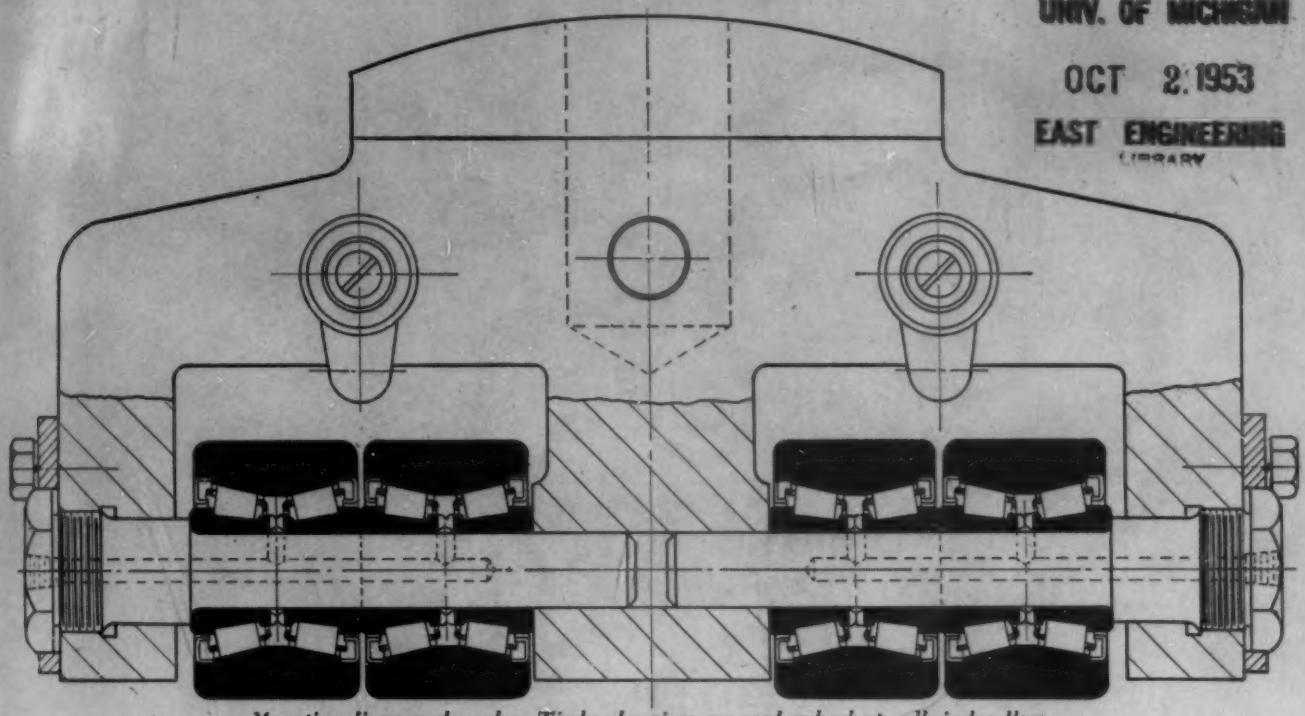


*Mounting diagram shows how Timken bearings are used as back-up rolls in levellers.*

## How TIMKEN® bearings as back-up rolls keep levellers from marking sheets

WITH Timken® bearings as back-up rolls, levellers flatten sheets without marking, give long, trouble-free performance. Because Timken bearings practically eliminate friction, they easily accelerate to top speeds. As a result, skidding and scuffing between work roll and back-up roll is reduced. This helps eliminate marking of the sheets. And because these bearings are both anti-friction bearings and back-up rolls, design is greatly simplified.

The OD of the outer race of each Timken bearing is the surface that contacts and supports the work roll. Because of the extremely smooth surface finish of the OD of these bearings, the work rolls are not marked with the result that the sheets are also unmarked.

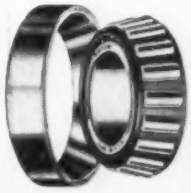
Finally, Timken bearings are able to take the tremendous radial loads set up by this operation. Line contact between the rollers and races gives them the load carrying capacity to take these loads with ease. Tapered construction allows Timken bearings to carry both radial and thrust loads in any combination. Deflection and end-movement of shafts and rolls is eliminated.

Always specify Timken bearings for the machines you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

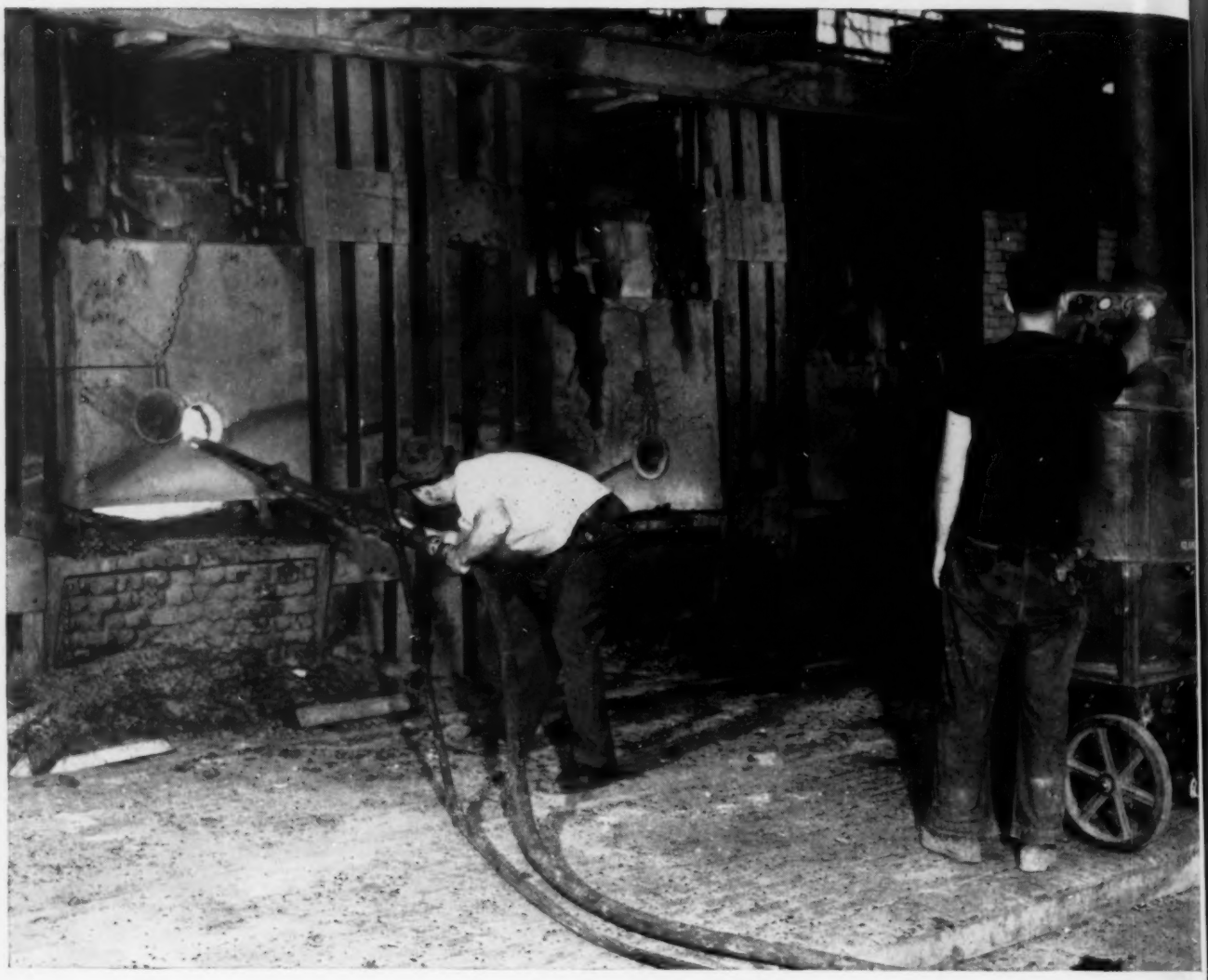
**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

*TAPERED ROLLER BEARINGS*



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ↓ AND THRUST →|← LOADS OR ANY COMBINATION



# Open hearth back wall is repaired with BRI Gun and Roebling furnace stays on line 3 extra weeks

HERE is another instance in which a BRI Gun paid for itself on a single emergency job.

Shortly after John A. Roebling's Sons Corporation placed their BRI Gun in service, a section of the back wall near the skew in one of their open hearth furnaces began to erode. This section was repaired with Gundol and Gunchrome M and the furnace kept on the line for three weeks, until the furnace went down for a scheduled rebuild.

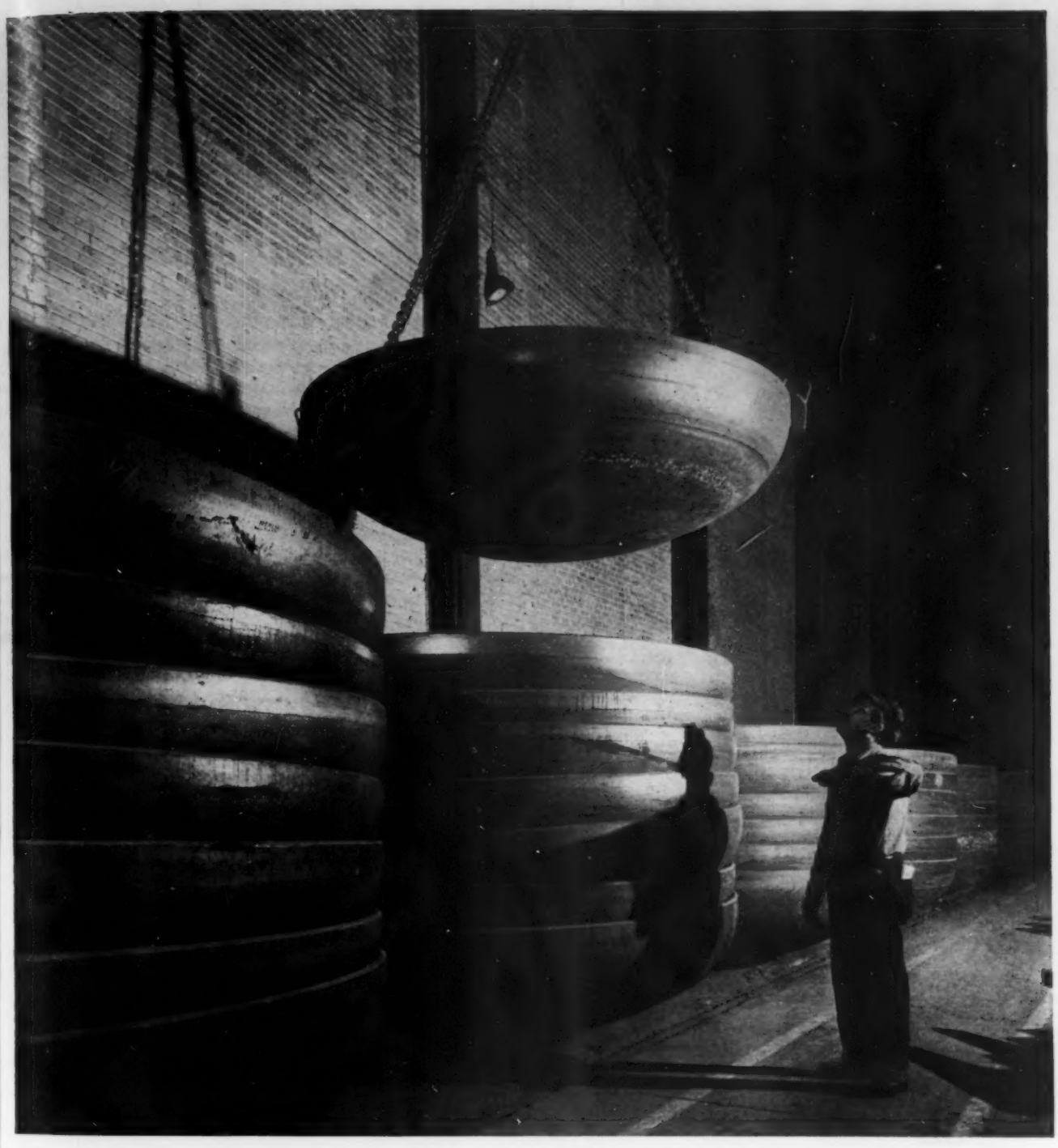
Now, fourteen months later, practically all Roebling furnace personnel are experienced in the operation of the BRI Gun and use the equipment regularly. Consequently, furnace life has been increased and the problem of skewback maintenance virtually eliminated.

Roebling's experience confirms that of the several hundred BRI Gun owners who have found the equipment easy to operate, cheap to maintain and highly effective for making emergency as well as routine repairs.

If you are not yet sold on the gun and on Gunchrome, Gundol and Gunmix, why not ask your Basic representative for the whole story?

*Basic Refractories Incorporated* 845 HANNA BUILDING, CLEVELAND 15, OHIO

*Exclusive Agents in Canada: REFRACTORIES ENGINEERING AND SUPPLIES, LTD., Hamilton and Montreal*



**FLANGED-AND-DISHED HEADS MADE IN EIGHT TYPES** By spinning and pressing, Bethlehem produces flanged-and-dished heads in these eight types: elliptical, tank car, obround-tank, flanged-only, double-dished, standard, shallow and ASME Code flanged-and-dished. Bethlehem Heads come in diameters up to 144 in., and in thicknesses from ⅛ in. to 3½ in. We also manufacture standard manholes and covers, hand holes and covers, flue holes, collar flanges and pipe flanges. If you would like to have full information, please write to us at Bethlehem, Pa., or to the sales office nearest you. Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

The Iron Age

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Vol. 172, No. 14, October 1, 1953

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**Address mail to 100 E. 42 St., N. Y. 17, N. Y.**

# DIGEST of t

## NEWS DEVELOPMENTS

**HOW TO PROTECT YOUR PLANT AGAINST FIRE—P. 3**
This four-page Special Report by a leading fire-pr vention engineer analyzes plant hazards and tells y how you can eliminate or minimize them. Best layo for new plants is outlined. Detailed steps are giv for you to take to prevent fire, to put it out. You c expect changes in building codes.

**TAPE SPEEDS MACHINE ORDER PROCESSING — P.**
U. S. Steel uses five-channel tape to integrate, contr order processing, collection of production cycle da "Common language" system allows machines to co municate with each other, keeps data self-perpetuati from start of operation until completion of norm cycle of clerical operations.

**DEVELOP IMPROVED NICKEL PLATING PROCESS—P.**
When plating experts mistake a nickel finish f chrome, you know it's a really bright nickel platin That's what happened when Hanson-Van Winkle-Mu ning showed samples coated by the new Nickel-Lun process. Costs for installation and operation are lo It's been tested in a commercial plant.

**HELPING KOREA DIG OUT OF THE RUBBLE — P.**
Getting started on reconstruction of the Korean eco omy is proving a major coordinating job for Washin ton planners. Official U. S. aid must be fitted in wi programs of Army, United Nations, the Korea themselves and private activities. Natural resource and unskilled labor are plentiful.

**SHIFTLESS AUTOS BRING BACK CONFUSION — P.**
Not as serious as the gear shift confusion of th Twenties, auto history is repeating itself today i seven different types of automatic transmissions. Eac has a distinct selector lever pattern. Lateral moveme and gating result in four basic types. Will a standar evolve? Firms differ.

**IKE STAYS MUM ON TAFT-HARTLEY CHANGES—P.**
Union efforts to draw White House fire—and get a inkling of proposed changes in the Taft-Hartley La have done no good. Neither will the President give an hints about a possible successor to Martin Durkin Recommendations on changes to the labor law won be sent to Congress before January.

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# the Week in Metalworking

## ENGINEERING & PRODUCTION

**INFRARED HEATING IS ECONOMICAL, CLEAN—P. 97**
Modern continuous process heating operations using infrared sources are economical, clean. Better control of the operation and elimination of overbakes resulting from conveyor system stoppage is possible. Infrared heating is clean, fast and can be applied to a wide variety of process heating operations.

**ELECTROSTATIC SPRAY PRIMES CAR BODIES—P. 102**
Uniform prime coats on Studebaker car bodies are being applied by electrostatic spraying methods. Paint is applied in half the time required for hand spraying. Paint losses are low. Grids charged with 90,000v create a strong electrostatic field into which the paint is sprayed and attracted to the grounded bodies.

**FIXTURE-TUMBLE LARGE PARTS AT LOW COST—P. 104**
Reductions in burring and finishing costs of large precision aircraft engine parts have resulted from a program of successful tumbling at Bridgeport-Lycoming. Successful use of the tumbling method depends on design of suitable holding fixtures. Rigid control of media formulas plus close inspecton pay off.

**TREPANNING TOOL SPEEDS GEAR PRODUCTION—P. 108**
Two cutters in a specially designed trepanning tool cut machine downtime and improved production on a helicopter power transmission bevel gear at Ford Instrument. Original cost of the tool has been more than amortized in a year of continuous production without breakdown due to cutting tools.

**—NEXT WEEK—AUTOMATIC PROCESS CONTROLS—**

Modern development of automatic process controls offer a unique and all-important contribution to industrial development during the decade ahead. The challenging developments in this vitally important phase of industry can be applied to practically every metalworking operation involving a flow of parts.

To help you visualize more clearly the great opportunities and potential of automatic process control in the metalworking industry, THE IRON AGE next week brings you an outstanding across-the-board picture of what industry is doing to improve product quality, integrate production, and hew down manufacturing costs.

## MARKETS & PRICES

**TAXES MUST GET NEW LOOK FOR SPRING — P. 37**
Congress must start to rebuild and overhaul the federal tax structure this January. Revenues are scheduled to dip about $7.2 billion, and cuts in spending can't match that rate of decline. Both the Treasury and the White House are worried about where the money will come from. Taxes will have rough going.

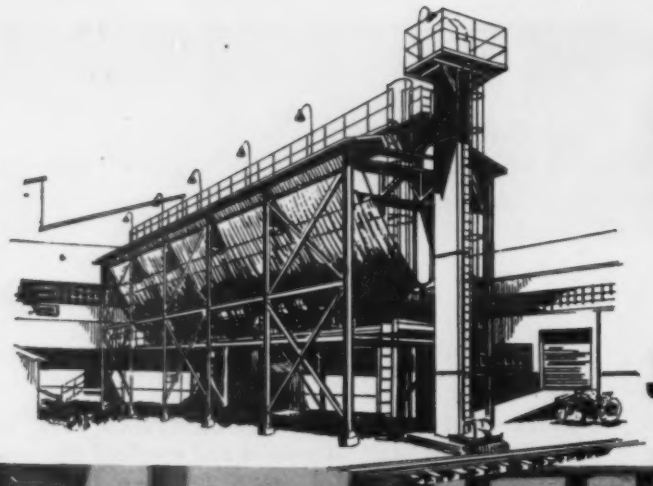
**NEW ENGLAND STEEL MILL GETS NEW BACKING—P. 38**
Ebasco Services has bought stock of New England Steel Mill Development Corp. for "two nationally known clients experienced in making, buying, selling steel." Certificate of necessity is being sought to provide rapid amortization of $26 million, nonintegrated, electric furnace mill to make bars, strip.

**ECONOMY WILL RELAX, NOT RELAPSE, IN '54—P. 41**
"Recession" has many ugly implications. The boom is weary and a downturn is imminent. But let's call it an "adjustment." Indications are that the transition will be moderate, that there's still plenty of room for prosperity. Depressions grow on gloom psychology. How influential trends shape up.

**INCREASE LABOR EFFICIENCY IN DECLINE — P. 67**
This week's Report to Management tells you how the labor, employment winds are blowing in the face of a moderate decline from boom business. Efficiency will improve as marginal workers are dropped. Costs will dip as overtime payments get the axe. Union policy will be determined by production trends.

**OPERATING RATE HOLDS, SOME PRODUCTS DIP—P. 135**
Though the steel operating rate holds close to the mid-nineties, some products continue to ease. Alloy bars, for example, are displaying the weakness that had been predicted for them. Most producers are down to a 5-day week on this item. During the shortage consumers were substituting alloy for carbon.

**MINERS ARGUE MERITS OF SLIDING TARIFF — P. 138**
Dissension continues over the best medicine for the ailing lead-zinc mining industry. American Mining Congress last week heard talks favoring and opposing the variable tariff, higher fixed duties, government subsidies. Meanwhile, the market shows no life. Aluminum Assn. issued improved statistics.



# VERSATILE...

## is the word for JEFFREY standard units

Line drawing: Jeffrey Standard Bucket Elevator feeding storage bin.

Photo: Jeffrey Twin-Spiral Conveyor System handling finished cement from mill to railroad cars for bulk shipment.

**OTHER JEFFREY STANDARD UNITS**

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APRON CONVEYORS
SCRAPER CONVEYORS
POWER SCOOPS

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Indexed in the Industrial Arts Index and the Engineering Index.

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# Our Foreign Policy Critics

THE United States is being severely criticized here and abroad for its reluctance to attend a Big Four meeting with Russia. The list of critics is quite illustrious. It includes among others: Prime Minister Churchill, British Socialist leader Attlee, Adlai Stevenson, some American businessmen, several newspaper columnists (abroad) and a few editors at home.

The general theme taken by these people is pretty much the same: We ought to meet with top level Soviet leaders whether or not we think anything will come of it. They believe that if we don't get anywhere then the world will know we tried and the Kremlin will be known for what most of us believe it has been for some time—a thoroughly irresponsible, evil Machiavellian regime.

The attitude of these critics of present U. S. policy seems to be that no one wants peace except them. Or that those who don't agree with them want war. They refuse to see the Communists as the most savage and brutal masters in history.

President Eisenhower had the best reasons in the world for not agreeing to any top level meeting with the Russian dictator at this time. He said that America would not meet at that level until Russia showed its good intentions by deeds rather than words. Mr. Dulles has since repeated that theme.

The President's experience with Russia and world events certainly qualifies him as one who knows what he is talking about. We have met with the Russians before. They did not live up to their promises. That's why the Korean war started and that's why it has paused on such a sour note.

The Soviets are still having internal trouble. It is not clear yet who will have complete power. To meet with Malenkov at this time would elevate him to a position of world leader. Why should we do that before they prove they can back up their promises with deeds?

What about the U. N.? Is it right for the Big Four to meet outside the U. N., thus telling the rest of the world that it doesn't count for much? Should we junk the U. N. and substitute Big Four meetings?

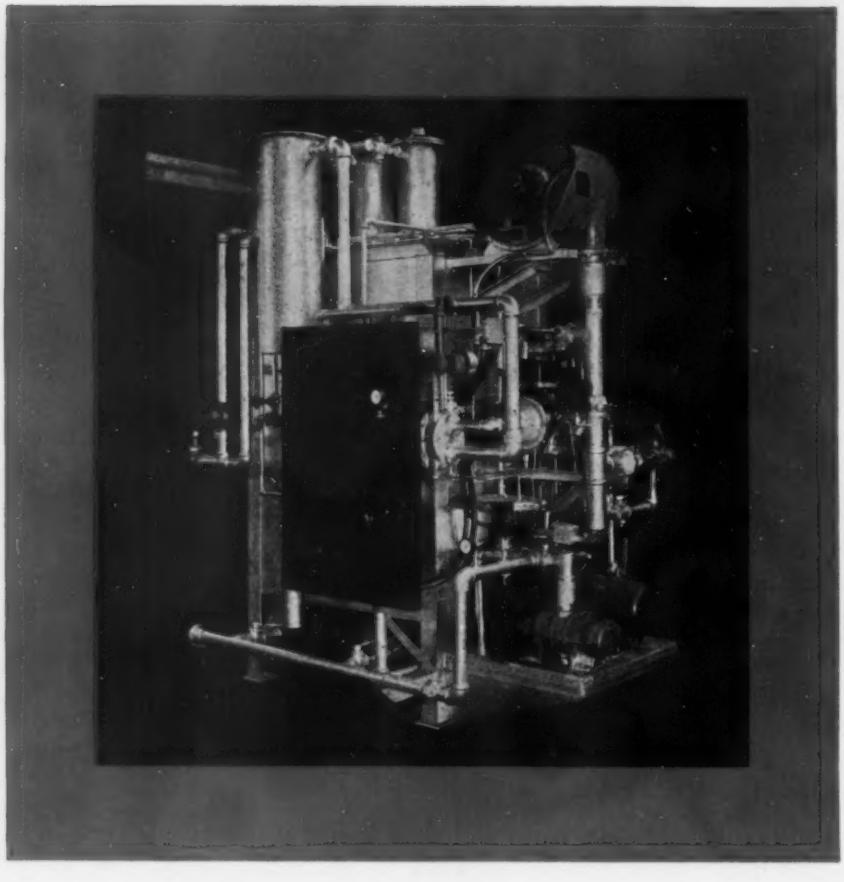
It may be true that our foreign policy leaves lots of room for improvement. But it certainly is more positive and realistic than what we had before Eisenhower took over.

Tom Campbell

*Editor*

# KNOW WHAT YOU GET

RX DX NX HNX AX HX



There's a fourth dimension in every atmosphere generator, which makes a significant difference in Heat Treat productivity and equipment earning power. It's the number of *previous successful applications* which, in the case of Surface generators, runs literally into thousands. Indeed, they go back to 1929, the year of the first use of a neutral atmosphere for controlling oxidation of non-ferrous metal. If you want the best guarantee that specifications will be met or exceeded, specify 'Surface.' The latest and most authoritative data on gas atmospheres are presented in our bulletin SC-155. We'll be glad to send you a copy.

***Specify* SURFACE COMBUSTION ATMOSPHERE GENERATORS**

See Surface exhibit, "FROM INGOT TO FINISHED PRODUCT," Booth 321, Metal Show.

# POCKET-GUIDE

**TO GAS ATMOSPHERES**

**FOR ALL REQUIREMENTS**

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|---|---|---|
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| **DX** LEAN | 250 to 35,000 | bright annealing and sintering (copper) |
| **DX** RICH | 250 to 35,000 | bright annealing, brazing (low and medium carbon steel) |
| **NX** | 2500 to 20,000 | bright annealing (copper, carbon steel), clean hardening (medium carbon steel) |
| **HNX** | 5000 to 20,000 | extra bright annealing (copper, low carbon steel), clean annealing (stainless steel) |
| **AX** | 100 to 4000 | rapid de-oxidation of surface metal, brazing, sintering (low carbon steel), bright annealing (stainless) |
| **HX** | 1000 to 15,000 | rapid de-oxidation of surface metal (low carbon steel), bright annealing (stainless) |

This condensed table of Surface Combustion prepared atmospheres (designations are trademarked) shows at a glance how broad a range of heat treat requirements they meet. Specified gas compositions are accurately and economically maintained, over the entire range of capacities. Your nearby Surface representative can draw from an unequalled fund of industry-wide experience, and recommend equipment best suited to your job. Bulletin SC-155 presents 8 solid pages of valuable data.

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# Dear Editor:

*Letters from readers*

### Rolling of Metals

Sir:

We have been advised that in the July 30th issue of IRON AGE you ran an article relative to a company located in the East which specializes in custom rolling of all types of metals to very thin thicknesses and to extremely close tolerances.

We would appreciate your advising us as to the name of this company so that we may contact them.

*R. E. ACKERMAN*
*Purchasing Agent*
*Borg Equipment Division*
*Janesville, Wis.*

**The article is about the American Silver Co., 36-07 Prince St., Flushing, Long Island, N. Y.—Ed.**

### The Gear Works

Sir:

Bill Danch's cartoon on p. 121 of your September 17th issue intrigues me. May I have the original for framing and display in my office?

*J. C. SEARS*
*Executive Secretary*
*American Gear Mfg.'s Assn.*
*Pittsburgh, Pa.*

**Iron Age cartoons are always available for readers' personal use on a first come-first served basis.—Ed.**

### Radio Isotope

Sir:

We are interested in the article "Cesium Radio Isotope Used for Parts Inspection" which appeared in the September 10th issue, p. 174. May we please have tear sheets of this?

*J. W. WELDON*
*J. W. Weldon Laboratory*
*Kansas City, Mo.*

### Aluminum Alloys

Sir:

Please send us two tear sheets of the article, "Aluminum Alloys Make Good Bearings" by D. B. Wood which appears on pp 168-169 of the September 10th issue.

*T. V. BUSK*
*Advertising Manager*
*Farrel-Birmingham Co., Inc.*
*Ansonia, Conn.*

### More Cleaning Output

Sir:

In the May 28th issue of THE IRON AGE, we noted with great interest an article entitled "Grinding Plus Mechanization Equals 2X Cleaning Output" by W. W. Fitzsimmons.

We would greatly appreciate receiving a reprint or tear sheet of this article if still available.

*H. J. PROSSER*
*Sales Engineering Branch*
*Bonded Products & Grain Div.*
*The Carborundum Co.*
*Niagara Falls, N. Y.*

### Low Nitrogen Steel

Sir:

In your September 10th issue, THE IRON AGE Newsfront carries a paragraph on a Canadian steelmaker soon to be producing low nitrogen steel.

Can you give us the name of this Canadian manufacturer as we are interested in looking into this subject further?

*W. G. WEISS*
*Weiss Steel Co., Inc.*
*Chicago, Ill.*

**The Canadian steelmaker is the Dominion Foundries & Steel, Ltd., Hamilton, Ontario, Canada. The process was developed by Brassert Oxygen Technik, Zurich-Zollikon, Geneva, Switzerland. A technical article on the process appeared in last week's issue. —Ed.**

### Metal Removal

Sir:

In the September 17th issue, on the Newsfront page, reference is made to a simple, accurate way to gage removal of metal without stopping the machine. Please advise the name of the manufacturer of such equipment.

*E. E. WAGNER*
*Chief Metallurgist*
*Hoover Ball & Bearing Co.*
*Ann Arbor, Mich.*

**This method of removing metal has been developed by The Sheffield Corp., Dayton 1, Ohio.—Ed.**

### Embossed Gaskets

Sir:

In the August 13th issue of your magazine on the Newsfront page, reference is made to improvements on all-steel embossed gaskets.

Will you kindly forward additional information on this subject and advise name of the gasket manufacturer?

*J. L. BIASETTI*
*Mgr., Production Engineering*
*Cummins Engine Co., Inc.*
*Columbus, Ind.*

**Further information may be obtained by contacting the gasket division of McCord Corp., Riopelle at E. Grand Blvd., Detroit 11, Mich.—Ed.**


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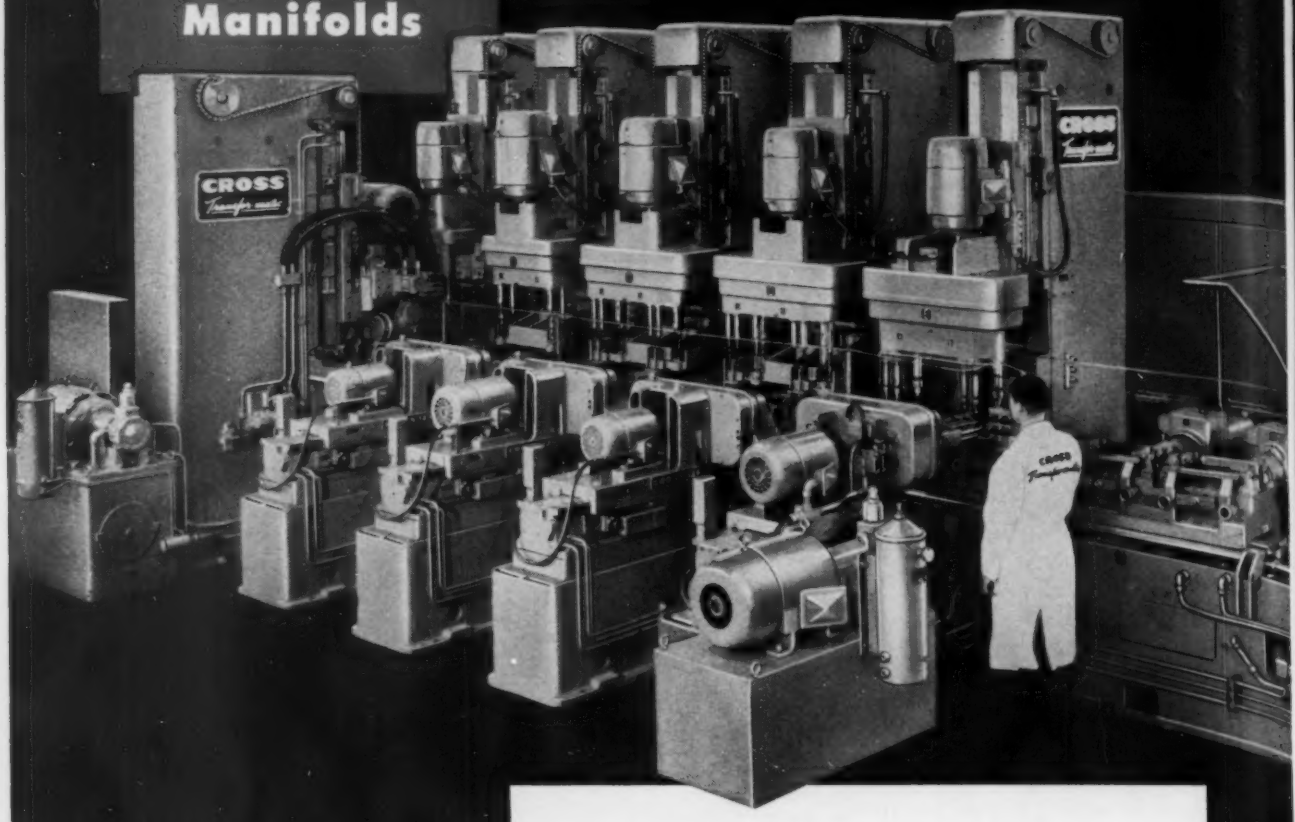
# Drills, Bores, Mills, Intake Manifolds

*Another Transfer-matic by Cross*



- ★ 218 parts per hour at 100% efficiency.
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- ★ 54 operations—22 drilling, 8 chamfering, 2 reaming, 12 tapping, 8 boring and 2 milling.
- ★ Two parts machined at one time in each station.
- ★ Palletized work holding fixtures and automatic transfer from station to station.
- ★ Power wrenches for automatically operating work holding fixtures.
- ★ Other features: Pre-set tools, built-in chip conveyor, automatic cleaning unit for removing chips from fixtures, J.I.C. Standard Construction.

*Established 1898*

THE CROSS CO.

DETROIT 7, MICHIGAN

*Special* MACHINE TOOLS

# Fatigue Cracks

*by William M. Coffey*

### Inside The Iron Age VIII

We have problems upon problems, perplexities upon perplexities. We get a letter from the wife of a subscriber complaining that THE IRON AGE scratches her table; the most powerful companies in the world threaten us with all their might and majesty when THE IRON AGE doesn't arrive a day before it's sent. Everybody is always mad at the Circulation Manager. Nobody around here gets blamed for so many things.

The editorial department gets the booquets (french), the "that was a splendid article last week. Can I get it framed for our cub scout den" type of letter. We get the "I paid for my subscription 3 years ago. Where's my Encyclopedia Britannica which you promised" type of letter. And now what happens? *They make us an Air Raid Warden.*

This means we have to herd the troops, a fine body of girls, into the stairway when the whistle blows so they won't get hurt when it comes. Darn that pre-Pearl Harbor ribbon for extraordinary heroism in inaction! Be dusting the typewriters next, you watch.

Which brings to mind the words of Professor O'Cobhthaidh that "they can bomb me to death, they can shoot me to death, they can torpedo me to death. But they can't scare me to death." There is no substitute for victory. *(It's easy to see we couldn't think of a thing to write about this week).*

### Women

More about women. Boy! You know, our greatest supporters are the wives of our subscribers, to wit, viz. When the Assistant Chief Engineer of the big company says he can't afford to renew his IRON AGE even though it means he won't make Chief Engineer, who always pipes up but Mrs. Asst. Chief Engineer who says, "No you don't, bud. One of the few pleasures in my bleak life is learning more about electrolytic pickling. Ain't I entitled to a little fun? I cook your dishes, wash your food, sweep your children. Isn't there anything else in life for me? Divorce me if you like, this old gray head, but send my IRON AGE." She says.

To wit, viz again: Mrs. Jeanne McHugh Kerr of Norman, Oklahoma writes—

**—Regarding your Postum Report of September 3 that a great many women in the U. S. are married to men who subscribe to Iron Age. May I suggest that you make a Sanka study of husbands whose wives subscribe to Iron Age? As a subscribing wife I suggest that these husbands might form a little organization which could be called HOWSTIA (husbands of wives subscribing to Iron Age). It would probably be a more select group than WOHSTIA (wives of husbands subscribing to Iron Age).**

### Women (cont.) Boy!

. . . and a WOHSTIA of Minneapolis writes:

*Your Iron Age*
*Is perused with care*
*And Gene needs its help*
*As we need daily fare.*

*But finances are nil*
*In our family of three*
*For we've bills & bills*
*And nothing comes for free.*

*But if with installments small*
*Each month we could pay*
*Your magazine we'd buy*
*Without delay.*

### Puzzlers

Bill Deford and two young ladies from London, England, Jean Orr and Joan Pocock, are additional winners of the Amoeba puzzler. Jean and Joan write "if the prize is a visit to the States, we shall be pleased to accept. However, a reply from you would please us greatly." We're married, but come on over anyway. It's a big country.

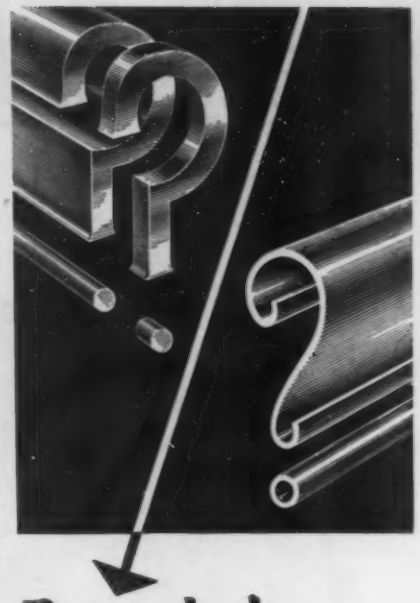
The answer to the puzzler in the Sept. 9 issue is that the mule carried 7 measures and the donkey carried 5 measures. Winners: W. B. Lobbenberg, J. S. Prifogle, Paul A. Tackett, H. R. Boyer, David Kahler, George E. Brunfield, I. I. Brugman and Mr. Rice.

### New Puzzler

William Braasch writes that since it is apple time here is a fine one for number one man, Mr. Rice:

At six o'clock in the morning 288 apples were counted on a tree. They are green and worth ½¢ each. They increase in value at the rate of ⅓¢ per day. The apples are falling at an even increasing rate so that 3 fall the first day, 9 the second day, 15 the third day, 21 the fourth day and so on increasing by 6 each day. On what day and at what time should they be picked to bring the most money, fallen apples having no value?

Am a little late with your puzzler, Bill, but sure appreciate it.

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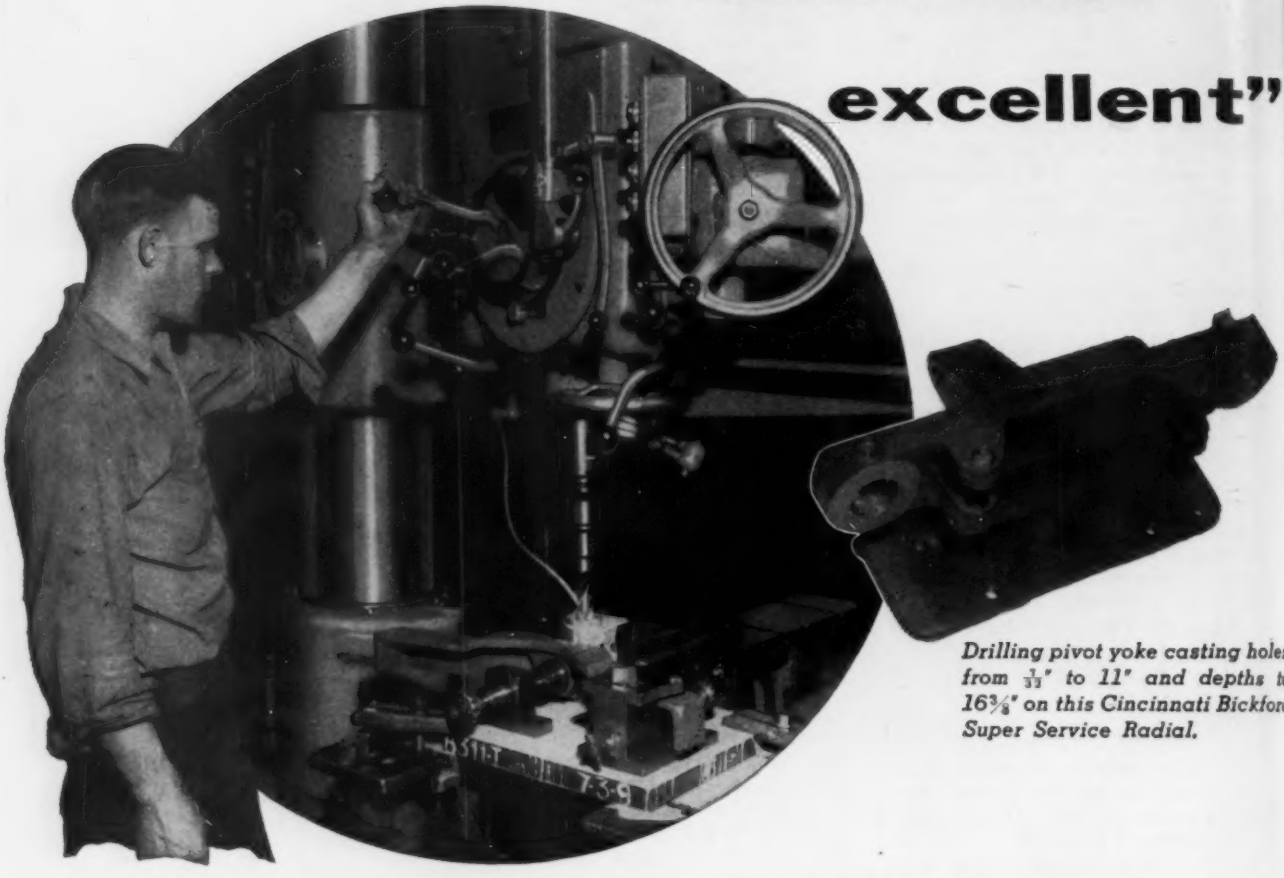

*Drilling pivot yoke casting holes from $\frac{1}{11}$" to 11" and depths to 16$\frac{3}{8}$" on this Cincinnati Bickford Super Service Radial.*

A prominent truck manufacturer has increased shop capacity in heavy drilling with this Cincinnati Bickford Super Service Radial Drill. They say "Better than excellent performance and for ease of handling, the best in this size machine".

The illustration shows the convenient grouping of controls which makes for easy, fast handling. Note the operator's unobstructed vision of the work, even with the head in a low position. These features can increase your output.

**Write for Booklet R-29 on these highly productive and accurate Cincinnati Bickford Super Service Radial Drills.**

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**Cincinnati 9, Ohio, U.S.A.**

The Iron Age
FOUNDED 1855

# THE IRON AGE Newsfront

FULL POWER ON EVERY WHEEL and top wheel-turning efficiency result from use of a new type transmission which drives laterally rigid wheels. Vehicle is steered by slowing wheels on one side, speeding up wheels on the other side.

STEEL INDUSTRY AND LABOR are fine-tooth-combing insurance and pension of 40 large companies in preparation for 1954 negotiations. Joint effort to develop an intelligent foundation for improvement of plans stems from agreement in latest industry contract revision.

THE "LONGER LOOK" WILL PREVAIL in most 1954 cars, but not because of increased wheelbases. Extended headlamp bezels, protruding bumpers, elongated rear fenders give the illusion.

SUCCESSFUL EXTRUSION OF TITANIUM is claimed by several producers. Elimination of much machining, plus a savings in metal, could prove a boon to aircraft firms as use of metal grows. Also, special cross-sections not available by machining, could be attained.

BRIDGE BUILDERS NOTE: FEDERAL-AID HIGHWAYS need $50 billion over the next 15 years to bring them up to standard. By 1975, 75 million vehicles will choke U. S. highways now full at 54 million. Highways now have 84,000 substandard bridges.

MEAT AX VS. CAREFUL PRUNING argument is raging in Washington over defense contracts subject to cancellation. The cleaver wielders seem to have the edge. Theory is there is but one way: To hack down spending. Then, if cuts hurt too much, corrective measures will be taken later.

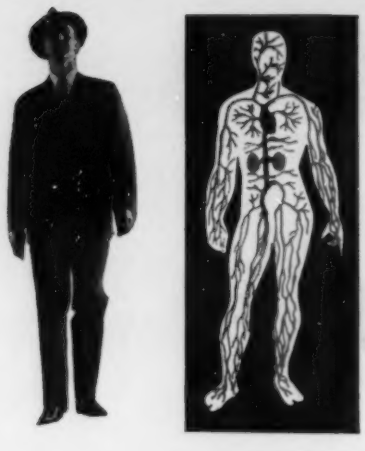
DEVELOPMENT OF ADDITIONAL ELECTRIC POWER in Upper Michigan should speed beneficiation of low grade ores. A lakeside steam generator is tentatively scheduled for January 1956 operation in the Marquette area. Total power consumption in the Republic and Humboldt areas is expected to double in the next few years.

INDUCTION HEATING OF STEEL BILLETS for hot extrusion is being tried experimentally by one company. Objectives: Elimination of downtime for sludge cleaning and furnace maintenance. Problems: Getting, maintaining, uniform temperature throughout billet.

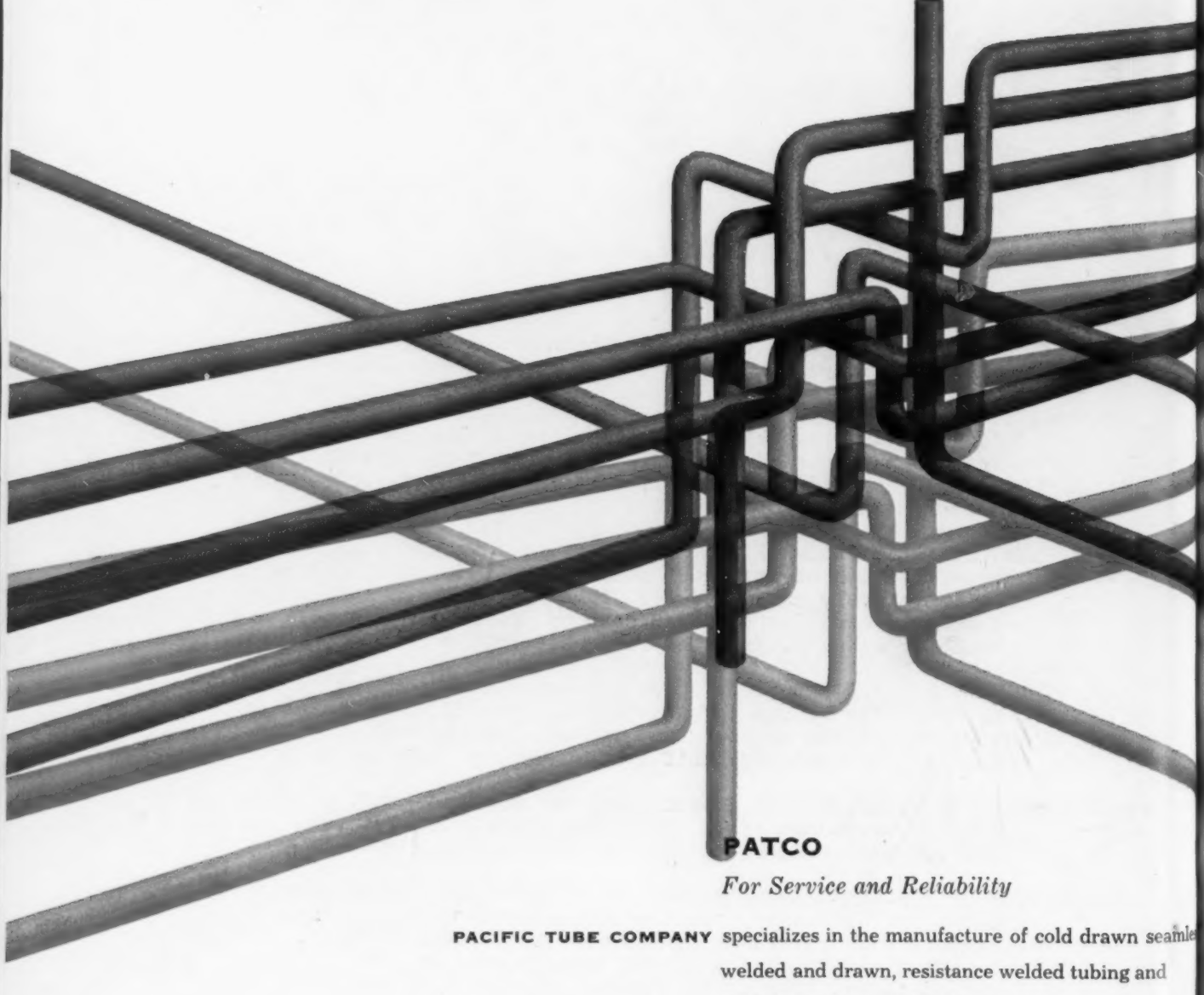
UNEMPLOYMENT IN MICHIGAN is a growing problem. At last count about 103,000 were unemployed, up 40,000 from July. Cutbacks and the General Motors fire account for most of the increase.

MANUFACTURE OF PORCELAIN ENAMELED CAST IRON POTS AND PANS is getting plenty of attention from the foundry and porcelain enamel industries. Spurred by demand for the foreign product, at least 12 companies are making or plan to make similar items. Demand is believed to far exceed supply, including imports.

GROWING USE OF HIGH SPEED TRACTORS has manufacturers hopping to keep up with new farm implement requirements. Needs: Improved design, better materials for plows, harrows, spring teeth, sweeps, shovels.



**THE LIFE BLOOD OF INDUSTRY FLOWS THROUGH STEEL TUBING!**



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# FIRE!

# What You Can Do to Protect Your Plant

**Planning, analysis of hazards can minimize fire danger to industry . . . Segregation of dangerous materials, processes a must . . . Worker training cuts losses—By G. E. Stecher.**

"Why? . . . How could it have happened? . . . Who fouled up?" These were metalworkers' first questions after they digested the news of the GM Detroit Transmission fire.

General Motors is often called the world's No. 1 industrial organization. It's been famous for years for production efficiency, the latest wrinkles in manufacturing safety. Yet within 3 hours one of its newest, most important plants was a smouldering shambles. "If it could happen to GM, what could our shop do to prevent it?"

You won't find a magic formula. Fire protection is dramatic only when it doesn't work. But you can minimize fire danger by a concrete day-by-day program. If you and your safety department don't feel qualified to do the whole job, expert advice is readily available from fire protection engineers, companies supplying protective equipment, your local fire department, state board or insurance company.

*Gilbert E. Stecher, nationally known Fire Protection Engineer, is the author of Fire Prevention & Protection Fundamentals.*

No matter who does the technical work, responsibility for a fire protection program belongs to management. Adequate information must be available, standards must be set and maintained, training programs installed—all management functions.

First step is to analyze the sequence of your manufacturing operation. A good way to start is to list all the materials actually used in your plant, plus the form in which they are used at different stages in the manufacturing process. You don't generally think of metals as combustible, but of course some are. And almost any powder or dust can explode, then burn.

Metal is by no means the only raw material in metalworking. Fuels, lubricants, solvents, cleaning and coating agents, paints, waste for wiping, lumber for crating and shoring, paper for wrapping and records—these are found in practically all metalworking plants. And they all burn merrily.

Logical things to check after raw materials are your storage areas, both for incoming items and outgoing finished products. Are all goods not actually going through manufacturing processes stored away from the production area? Where different classes of material are involved, are they segregated from each other? Metal generally won't burn, but it will buckle, twist from high temperatures in adjacent areas. Similarly, fine finishes can be permanently ruined.

While you're checking storage, check how much you store. How fast can you get delivery on various items? Is it really necessary to keep that much solvent on the premises? Or is more just a phone call away?

The same thing applies to finished products. Many metalworking products are packaged, even more crated. Do you really need that high an inventory at the plant? Don't forget that insurance rates often vary with quantity of combustibles stored.

**Planning can cut hazards, quicken output.**

Now that you know what you're working with, you're ready to check actual plant processes. Remember that a hazardous operation can be a bottleneck just because of need for safety precautions. Replanning can often reduce hazards and speed production too.

One firm recently had to conform to an English formula for coating and japanning metal bomb fins. Batteries of spray booths and japanning ovens had to run three shifts to keep up with the rest of the plant. Result was a continuing hazard, which required constant vigilance. Special precautions made this step a real production bottleneck.

Solution was to install a continuous spray booth and dipping and drying operation. A Ransburg-type spraying and detearing system reduced hazards, eliminated an exasperating bottleneck.

Proper ventilation does more than make things smell nice. It can be a major factor in reducing fire hazards. Metalworking uses many volatile materials. A heavy concentration of fumes obviously spells trouble. Don't forget that these materials should be handled and stored at low temperatures. Heat can boost pressures in sealed containers to the explosion point.

Finely divided materials are just as dangerous. Aluminum, for example, is practically no hazard in bar or other solid form. Its melting point ranges from 1175 to 1500F. But in powder form it can be ignited at very low temperatures. The Haber Corp. fire in Chicago last spring is blamed on aluminum dust in the air. This disaster killed 34 workers, sent 29 to the hospital.

Magnesium is in the same category. Grinding stands and polishing jacks produce large quantities of magnesium dust. They must be equipped with dust collectors of sufficient capacity. Water is generally accepted as the best medium to use in collectors to minimize fire, explosion damage.

But don't forget that any dust can be dangerous. A Chicago housewife blew out the wall of a brick apartment house a few years back when she dumped some maggotty flour down an iron incinerator shaft.

You're probably more used to thinking about safeguarding machinery than protecting your plant from it. But machines can be prime fire causes if not watched. They can produce sparks, generate static electricity, or by friction ignite combustible materials.

Belt driven equipment should be watched closely for static electricity; if allowed to clog or become misaligned it can produce dangerous heat through friction. In grinding or reducing operations special care should be taken to prevent direct power drives from clogging, with resulting frictional heat.

Static electricity is a widespread hazard, particularly in

blending or coating operations. Machinery should be grounded and the air ionized within the working area. In coating processes personnel should be grounded when working directly on machines.

Humidity control is essential in these operations. Allowed tolerances generally run 50 to 60 pct. Belts and moving sheaves should be grounded in atmosphere containing combustible gases, dusts or vapors. High torque starting devices will prevent clogging in elevators and grinding operations.

You naturally insist that machines be kept oiled. But don't forget that lubrication is a fire prevention technique. More than one fire has been started by an overheated machine. Be sure that the oil used will maintain safe operating temperatures. Needle valves on drip feeds can be clogged with dust if not checked regularly. Make sure all lubricating devices are so located that they can be seen readily, reached easily and protected from damage and dirt.

**Give special thought to vital dies, tools.**

Modern metalworking would be unthinkable without welding and burning. With welding torch temperatures ranging around 2000 to 2400F, need for care should be obvious. But underwriters' reports show a shocking neglect of elementary safety practices. The *Normandie* and the GM fires are just two of the better known fires that are started by welding every year.

Two men should be present at all welding operations. A large fire extinguisher should be in immediate reach at all times. Foremen should be responsible for enforcing safety practices whenever welding is done in their departments, should have authority to halt any work not being done in accordance with regulations. Night watchmen should be informed of any areas where welding has been done during the day.

Oxygen cylinders should be kept free of oil, never handled with greasy gloves. Welding hose should have special care, be replaced at once if defective. If you generate your own acetylene, get expert advice on proper operating practice.

Your dies, patterns, molds are vital to production, expensive to replace. They should be stored in fire resistant, segregated areas when not in use. Destruction by fire or rusting from water damage could shut down your whole plant.

No matter what manufacturing process goes on in your plant, you can certainly find a recognized technical standard covering proper fire prevention practices. There are several sources for these, your local fire department or fire insurance company the obvious ones. But special cases merit special attention. Galvanizing lines, for example, generate hydrogen.

Any operation involving fur-

**BEFORE FIRE STARTS . . . Take these steps—**

**Check with underwriters before building.**
**Insist on fire wall segregation.**
**Train employees in fire prevention.**
**Stress use of proper type extinguishers.**
**Watch ventilation in hazardous areas.**
**Provide easy access to fire doors.**
**Check raw material analysis and storage.**
**Keep lanes open for fire equipment.**
**Inspect extinguishers regularly.**
**Watch sprinkler maintenance.**
**Test and inspect fire hose.**

**BASIC PROTECTION INCLUDES . . .**

**IF FIRE STARTS . . . These will stop it—**

**Complete sprinkler protection.**
**Fixed extinguishers . . .**
**In all danger areas.**
**On machinery.**
**In critical spots . . . control cabinets, etc.**
**Portable extinguishers . . .**
**Carbon dioxide**
**Dry chemical**
**Foam**
**Hose**
**Sand buckets**
**Soda-acid**
**Water buckets**

Construction safety features are a must.

naces deserves your closest attention. Furnace manufacturers have recommended procedures. Adhere to these scrupulously unless expert opinion indicates otherwise.

Processes involving large quantities of flammable liquids such as oil hardening, dip tanks, etc., should of course be watched with special care. Responsibility for observance of proper safety precautions should be laid directly on the shoulders of your chief operating executive.

You can expect drastic revisions in industrial construction codes following the GM fire (THE IRON AGE, Aug. 27, 1953, p. 44). Regardless of the age of your present building, there are certain things you should check.

(1) Different processes should be segregated by fire walls or at least fire doors.

(2) Machining and metalfinishing areas should be segregated in separate buildings wherever possible. Where not, sections devoted to different operations should be enclosed with standard fire walls of 12-in.-thick brick or its equivalent, extending to the roof and having a 3 ft parapet extending beyond the main roof level. Fire doors in these walls are basic.

A feature of the GM fire was the rapidity with which it spread. The Detroit Transmission plant was typical of many modern metalworking structures. It enclosed a large area designed for continuous operations. Fire barriers are essential; must be complete barriers covering conveyor lines, elevators, passageways, etc.

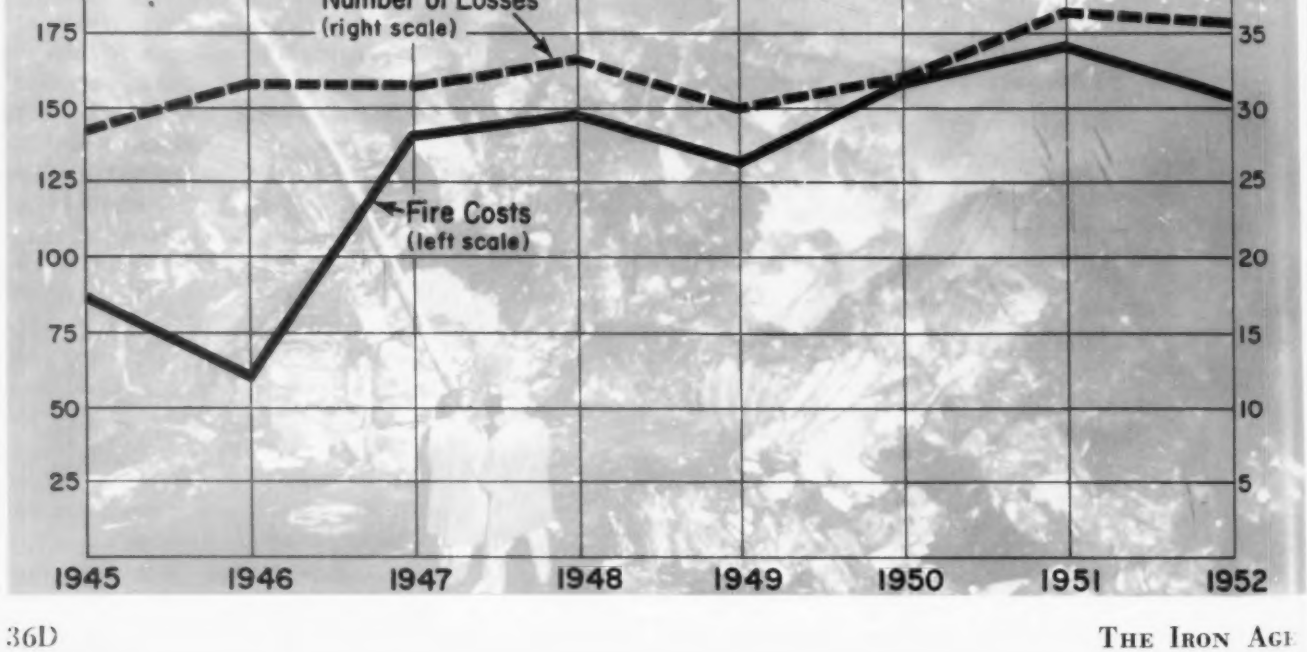
You may keep your feet on the ground but don't forget to look at your roof. Not the most expensive part of your building, it is the most vulnerable to hot gases and flame. Roof collapse is a commonplace in industrial fires, can damage or destroy valuable equipment, machinery, stockpiles. Roof cutoffs are economical and practical. Roof barriers to prevent the passage of gas, flame and smoke between trusses should be installed regardless of the type of roof. Sliding skylights or vents should be constructed in the roofs between trusses. These can be operated automatically by a fusible link or rigged for manual operation.

Ultimate step in any fire prevention program is training personnel to meet actual outbreaks of fire. All personnel should be trained in operation of fire extinguishers. The use of different extinguishers for different types of fires should be carefully explained and workers given the opportunity to actually use these extinguishers.

Have it clearly understood with all supervisors that they are directly responsible for fire protection in the departments they run. Stress the fact that maintenance and inspection of fire control equipment must be a matter of routine.

When you have completed your step-by-step analysis of your plants' operations, give basic fire prevention information to your supervisors, your plant fire brigade and your local fire department. Include a descriptive map of your plant showing areas where flammable materials are stored and hazardous processes used.

It may seem elementary, but make sure that every employee knows how to report a fire. Underwriters' reports highlight losses due to the roundabout way in which fires were reported.



# TAXES: Must Get New Look for Spring

**Congress must refurbish federal tax structure in January . . . Revenue to dip $7.2 billion . . . Spending cuts won't keep pace . . . Treasury, White House worry—By *A. K. Rannells.***

It looks now as if Congress must tackle a job next January that it has been consistently ducking for nearly a decade.

There seems to be no way of avoiding a major overhaul and rebuilding of the jerry-built tax structure—created over the post-war years by adding a new one here, a special one there, and boosting an existing one now and then for good measure.

### Need Less Spending

Reason the distasteful task can't be put off is that the whole thing is toppling. The Federal Government is faced next year with a sharp drop in its revenue take.

Decline in revenue income is estimated all the way up to more than $8 billion, a figure which appears sound.

On the other hand, governmental expenditures will drop by a far lesser amount despite economies and defense cutbacks.

This is because the government has created certain fixed costs which can't be trimmed much, if at all. First, there is the public debt, which eats up $6 billion in interest annually.

And there are veteran pensions and services which require nearly $5 billion. Old age pensions and benefits—exclusive of unemployment payments—chew up another $2.5 billion.

There are still others, not taking into account defense spending which is not likely to be reduced below the $40 billion level for another few years. Commitments and authorized orders make certain of this.

Revenue loss will come from three major sources—expiration of Excess Profits Tax, $2.5 billion; automatic reduction in personal and corporate rates, $3 billion and $2.5 billion, respectively; and reversion to pre-Korean rate for numerous excises, $1 billion—for a total of $9 billion.

Actually, the loss isn't this much. Not mentioned by the government is the scheduled increase next January in its social security take—bringing in about $1.3 billion in new money.

This is gravy, at present. Last year, under the 3 pct rate (split between employee-employer) collections amounted to $4.1 billion. Benefit payments, not counting administrative cost, totaled $2.7 billion.

END of excess profits tax and a 10 pct cut in income taxes are promised by Treasury Secretary George Humphrey.

But even facing a $7.2 billion drop has Treasury Secretary Humphrey walking in circles. How can the government offset this loss?

Both White House and Treasury have promised that renewal of EPT won't be sought. However, it is no secret that both would like to keep corporate and personal income rates where they are.

But a trial balloon loosed by President Eisenhower last week ("no tax . . . is too hard") got a chilly public reception.

Secretary Humphrey says he has weeded the scores of proposals and recommendations down to about 40 for serious study. These include the controversial sales tax and a manufacturers tax.

States are ready to go to bat in opposition to a national sales tax, regarding this field as peculiarly their own. Retail trade associations are setting up battle lines.

A manufacturing tax is certain to meet equally as violent opposition. Trade groups will emphasize to the public that the effect will be to increase the consumer tax bill.

### Congress Serves Notice

For example, it is pointed out, a 10 pct tax at factory level is pyramided to about 17½ pct by the time it reaches the consumer. Both taxpayer and Uncle Sam lose.

Also, the House tax-writing committee and the Senate finance group (which must approve), not to mention individual congressmen facing re-election next year, have warned that Congress is in no mood to impose new taxes.

Second guessers in Washington say this leaves no alternative. Congress will have to revamp the whole tax system.

This involves shaving a little here, adding a little there, removing inequities and broadening the tax base, hoping that the result will add up to more governmental revenue.

For what it is worth to the corporate and individual taxpayer watching developments, there is some indication that more congressmen are taking the attitude that the only real solution is to reduce government cost and spending. This won't be easy.

## Living Costs Still Climbing

Cost of living continues its climb. Consumers' prices crept up 0.9 pct from July to August, reaching an all-time high for the second straight month, reports National Industrial Conference Board on the basis of its monthly 10-city survey. The August increase marked the fourth month in a row that consumers' prices have risen.

The NICB's index showed August prices at a level of 182.6 compared with 181 in July of this year, and 180.8 in August, 1952.

# STEEL: New Hope for New England

**Ebasco buys Steel Development Corp. for clients . . . Seeks fast tax writeoff for $26 million, nonintegrated, electric furnace mill in New England—By W. V. Packard.**

Efforts to establish a steel mill in New England are being revived with fresh backing.

Latest development is purchase of the stock of The New England Steel Mill Development Corp. by Ebasco Services, Inc., New York.

Ebasco is acting for two "nationally known" clients who can not be named at this time. But they are described by an Ebasco spokesman as "experienced in making, buying and selling steel . . . the type of neighbors New Englanders would want."

### Suggest Smaller Mill

Ebasco has been researching the project for several months. Its studies have resulted in a favorable report recommending as feasible and profitable a nonintegrated specialty mill in the area. Studies will continue to clients' order and may embrace engineering design and organization of an operating company.

Recommendations point to a nonintegrated electric furnace mill of 200,000 to 300,000 tons annual capacity. This would probably involve installation of several furnaces.

### Seek Diversification

It would be a specialty mill aimed at serving diversified New England demands, with products ranging from alloys to killed carbon steels. Mill would produce flat-rolled steel, in addition to a wide range of bar sizes.

Cost of the plant is estimated at close to $26 million. Financial details have not been completed. But a certificate of necessity paving the way for rapid amortization is being sought.

Preliminary negotiations have been conducted with Connecticut Light and Power Co., but no firm power rate agreement has been reached.

The New England Steel Mill Development Corp., purchased by Ebasco, has played a leading role in the rise and fall of Yankee hopes for a steel mill. It was formed in 1949 after 2 years of research and promotion by The New England Council and interested companies and individuals. It was to provide legal framework for establishing a million-ton, $250 million integrated steel mill.

But the dream was never realized. Backers of the project did succeed in getting a certificate of necessity twice extended providing rapid tax amortization. And large amounts of local money had been pledged.

Then came adversity: (1) An unfavorable report from consultants Coverdale & Colpits who had been retained to make a study of the project. (2) Announcement by Bethlehem Steel Corp. who had cooperated in the study, that it did not wish to exercise an option it held. (3) Large new expansion programs in the East by Bethlehem and U. S. Steel Corp. (Fairless Works).

With competition thus tightening in the East, other steel firms were unwilling to undertake the project, and it was abandoned.

"I like to run through the plant once in a while . . . get a kick out of the rumors it starts."

In spite of these reverses it is not difficult to understand why the idea of a steel mill in the area continues to be intriguing.

It is the largest industrial area in the nation without sizeable steel production of its own. And, more important, a mill there would have a natural freight advantage of $9 to $12 a ton over large mill suppliers on the East Coast. Whether freight is absorbed or paid by the consumer, a local mill would enjoy this cost advantage.

### Can Get Help

Other favorable factors include abundant supply of good scrap and relative low capital cost of electric furnaces.

There is no dearth of statistics on steel consumption, and possible production in the area. In addition to surveys by local groups, studies have been made by Econometric Institute, Coverdale & Colpits, H. A. Brassert & Co., all of New York. In addition, last year a "Survey of Industrial Opportunities In New England" by Arthur D. Little, Inc., Cambridge, Mass., resulted in recommendations for an electric furnace mill similar to the one now being recommended by Ebasco.

### Glad It's Someone Else

What is the attitude of former sponsors of the project in New England? They wish Ebasco and its clients every success, and they'll cooperate fully in any way they can. But they seem relieved that someone else is carrying the ball for a change.

Even former critics of the big mill project may be softened up by the new studies pointing to feasibility of a nonintegrated electric furnace mill of moderate capacity.

No one could blame medium or small steel producers for not wanting to bump heads with U. S. Steel and Bethlehem by undertaking a large, integrated project in the East.

# TAPE: Speeds Order Processing

**U. S. Steel uses five-channel tape to integrate, control production data . . . Permits business machines to "talk" . . . See more electronics uses—By J. B. Delaney.**

A new concept of business procedure based on machines that "talk" to each other is approaching full reality. Some machines specially designed for the system are on the market, others are being blueprinted by business machine manufacturers, should be in production within the next year.

The development is the brain child of U. S. Steel Corp., which has played an important role also in the design of new equipment.

In a nutshell, the concept encompasses a system whereby business machines will communicate with each other through the "common language" of a five-channel punched tape. (See illustration.) Data would be self-perpetuating from origin of a given transaction until completion of the normal cycle of clerical operations.

### Needs New Machines

Marvelous as it sounds, its creators consider the common language system a mere mechanical stopping-off place on the road to even more marvelous aids through electronics. Thus far, they say, application of electronics to everyday business is still in the future.

Office machines now using the five-channel code include production recorders, bookkeeping machines, calculators, adding machines, typewriters, tape to card, card to tape, Card-A-Type, and electronic computers.

For the company already tooled up with earlier model machines, a switch to the common language system would be expensive since newly-designed equipment would have to be purchased. Present machines are not adaptable.

U. S. Steel believes the rewards of greater efficiencies, increased value from data, and greater timeliness more than offset cost of installing new equipment. Also, adoption of the new system would enable fewer machines to do the same job.

U. S. Steel calls its system "integrated data processing through common language machines." It sums up its concept as (1) recording of data at point of origin on office machines which create punched tapes or cards as the automatic byproduct of the recording operation; (2) processing original and subsequent data on office machines which read and punch tapes or cards, so that (3) all data is self-perpetuating.

This is an example of how the "common language" system would work:

1. An order received at the district office of a steel company is typed on a typewriter which simultaneously punches out coded tape.

2. Information is transmitted to the producing plant by teletype through use of the coded tape punched out by the typewriter. The producing plant teletype machine prints the message on paper and simultaneously punches out a duplicate tape.

3. Duplicate tape is read by a typewriter and at the same time new information is entered manually by the typist. This results in a printed record and a combined tape containing both duplicate and keyboard data.

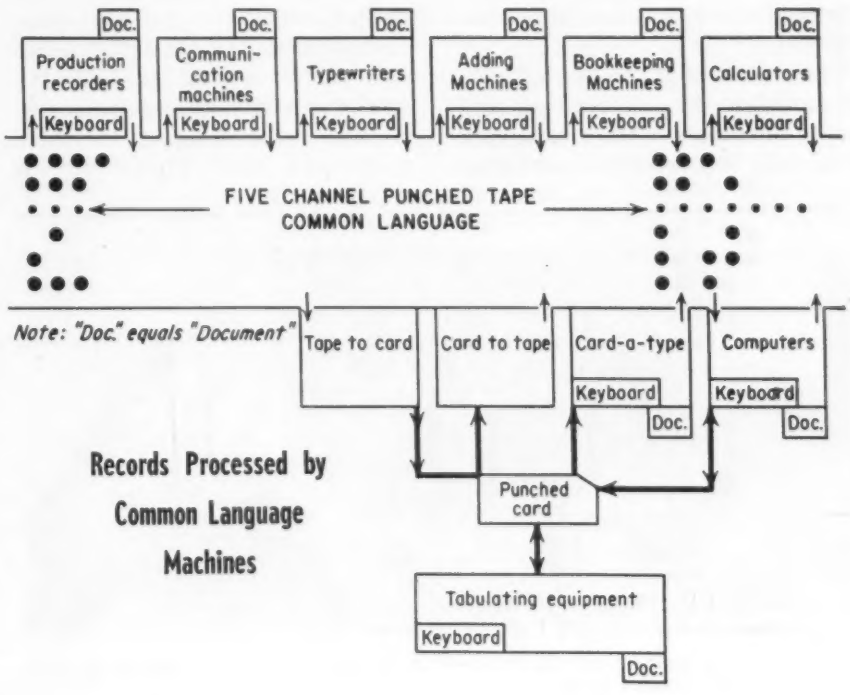
4. Combined tape is fed into a calculator and more new data is entered by keyboard. Result: A new document and a consolidated punched tape.

5. Process continues through such machines as tape-to-card, Card-A-Type, and so on until the transaction is complete. Final coded tape contains a complete record of the order and its journey from time of receipt to shipment of steel.

U. S. Steel believes integrated data processing through common language machines is adaptable to small as well as large businesses, in centralized or decentralized operations.

The steel company considers the common language system a bridge between current business procedure practices and great developments in the future. Its specialists know that better things are coming but feel that the system now being evolved will smooth the transition.

For that reason alone, they believe it is worth the investment.



# POWER: More for Ore Beneficiation

**Planned $6-million power plant near Marquette designed to make beneficiated Michigan peninsula ores more competitive . . . Operations slated for '56—By *R. M. Lorz.***

Investors in the upper Michigan peninsula are sure the area will continue to grow as beneficiation of low grade iron ores picks up steam. Their most recent vote of confidence came last week when it was announced that a $6 million steam generating plant would be built in the Marquette area.

### Make Ores Competitive

Construction of the steam plant, which should start operating in January 1956, has been jointly undertaken by the Upper Peninsula Power Company and Cliffs Power & Light, a subsidiary of the Cleveland Cliffs Iron Company.

Preliminary engineering and design work has been going on for some time. Once the project has been ok'd by government authorities, ground will be broken on or about Nov. 1.

Present plans call for operation of the first 22,000 kw unit to start in January of 1956. Two more units should be completed within 10 years. This new addition to the thermal electric facilities in the upper peninsula will operate as the Upper Peninsula Generating Company.

To insure more economical servicing of industrial, wholesale and retail customers in the area, Upper Peninsula has also signed an agreement to take over transmission and distribution facilities now operated by Cliffs Power and Light. An interconnecting line will be built from Humboldt to Atlantic. Merger of the two systems should provide customers in Ishpeming, Negaunee, Munising areas with an ample supply of economical power.

Mr. V. P. Geffine, President of Cliffs Power and Light, told THE IRON AGE the merger and formation of the generating company had been undertaken basically to make beneficiated peninsula ores more competitive and pave the way for expected growth, both industrial and residential.

### Complete It This Spring

Although plants for processing low grade ore at Republic and Humboldt are not yet completed, both figure prominently in present power expansion plans. According to Mr. Geffine the contemplated steam generating unit will dispose of half of its total output to beneficiating plants.

The Humboldt development is scheduled for completion this spring, while the Republic plant isn't expected to get into production until sometime in 1955. Potential annual output at Humboldt, a joint undertaking of Cleveland Cliffs and Ford Motor Co., is pegged at 400,000 tons. The Republic unit will process at least one million tons annually when operating at capacity.

Authorities believe completion of these processing projects will double power consumption by 1961. Although exact figures are difficult to pin down most mining men agree that it takes about three times as much power to process low grade ore as it does to handle material from deep mines.

### Need More Power

In round figures it seems likely that 1952 power consumption, estimated at 152,000,000 kw, should jump to over 300 million kw by 1961. Statisticians and planners say electrical power ticketed exclusively for mines should increase from about 70 million kw in '52 to something like 214 million kw in 1961.

Additional manpower will also be needed to speed the processing and this will mean population growth. Population estimates for the area now range between 25,000 and 30,000. Municipalities expect the figure to double in 10 years.

The population growth will mean greater demand for residential power as users turn more and more to electricity for cooking, refrigeration, water-heating and other household uses. The merger of Upper Peninsula and Cliffs Power promises to provide the diversity and economy these people will want.

Until the steam generating unit swings into action Upper Peninsula will supply most of the area's needs with diesel and hydroelectric units.

Selection of the lakeside site for the steam generating unit should solve a long time need for more peninsular thermal electrical power.

Widespread publicity which greeted the Ebasco Services report generally revolved around the need for such a development to foster industrial growth in the area. Readily available supply of water and coal at the tentative site should provide the answer. Financing arrangements have been completed; engineering contracts have been let, and in a short while ground will be broken.

PONTOONS were needed to cut the 16-ft draft of the Marine Star to navigate the 9-ft-deep Illinois waterway through Chicago.

# ECONOMY: We'll Get Gentle Recession

**Call it adjustment if you like . . . But the boom is weary, must relax . . . No longer an "up" but prosperity indicated . . . How influential trends shape up—By *T. Metaxas.***

"Recession," a word rife with ugly implications, means to many of us the rather panicky retreat of the economy into a dim zone between prosperity and depression. Since the boom's momentum is mildly dissipating and a downturn's imminent, the problem becomes how much recession, or more aptly "adjustment," will we get?

If as is indicated the transition is moderate, prosperity will not be wrenched off stride. Too much adjustment, feeding on depression psychology, could provoke an unwarranted landslide.

### Riding Boom Crest

But the last is unlikely because all evidence today signals a minimal downturn causing no awkward economic dislocation. We will witness a period of less boom but still vigorous prosperity. Despite occasional faltering the eventual production trend is always up.

That we are now at boom crest gets support from Federal Reserve Board's production index which rose to 238 in August, righting itself after its July sag. Income, sales, and spending continue at record levels. But the turning point to less boom has been reached, will become more apparent as months pass.

### Mainstays Slacken Pace

Factors nourishing the boom have been shedding much potency. There is no longer an "up." Instead down trends are abundant. Most obvious clue that transition is here today is expanded production's running abreast of or passing consumption. Significant are declining order backlogs, inventory pruning, cutbacks in durable goods industries, and, however trifling, the wane of retail counter activity.

August retail buying at $14.2 billion climbed 6 pct over August '52 but when seasonally adjusted was off 2 pct from July. A more spirited retailing revival had been expected.

Such industrial mainstays as industrial construction, appliances, autos, housing, machinery went to lofty output quotas this year. Now they slacken their pace, will gradually ease it off further. Outlook for the steel industry, a reflection of future manufacturing hopes, is for a lower, but relatively high 1954 operating rate.

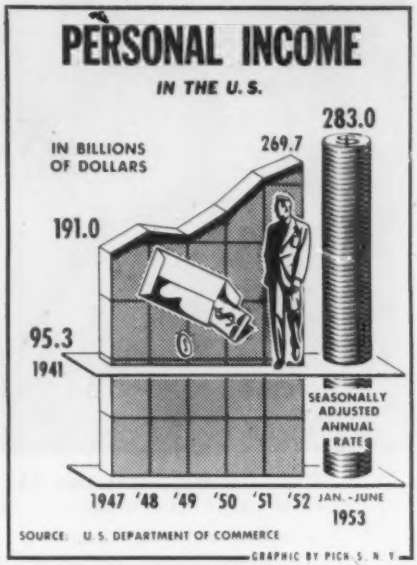
Moderate declines in these backbone industries will drop gross national product, now sprinting along at $370 billion per year, by billions. Their mild cutbacks will reduce their purchases from other industries, pare the incomes of many workers.

### Spending is Supreme

Defense spending can be a spurious prop to the economy when it bleeds away purchasing power from consumers in taxes, inflation, converts it into wasteful goods. But its sudden withdrawal can dislocate an economy made dependent on it. Curve of defense spending will slope down gently and next year should continue substantially unchanged. No shocks are in store.

Undisputed kingpin of the economy next year will be the consumer. His towering personal income of

"Before I got bifocals I'd set the machine and forget about it. Now I can't keep from fiddling around until I ruin it."




$288 billion per year is bolstered by record employment of 63.3 million. With such a head start, income and employment will remain the bedrock of prosperity.

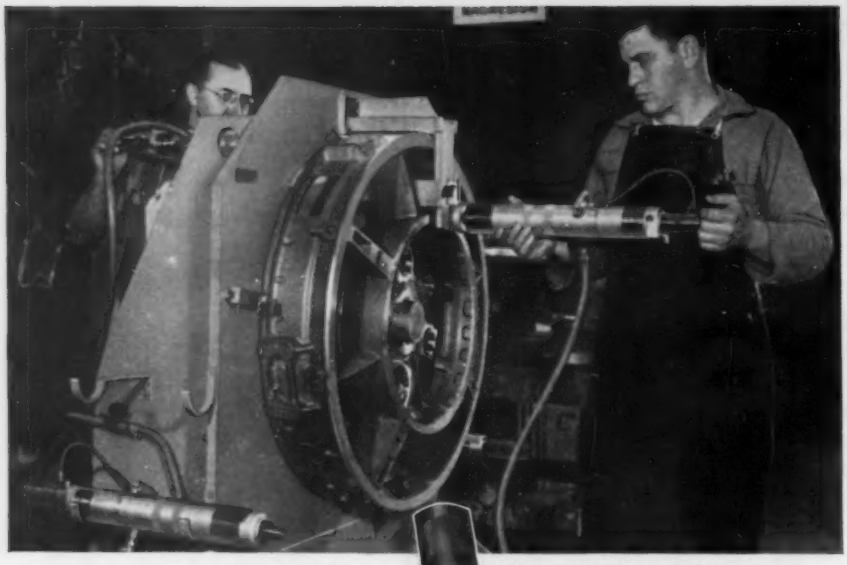
Employment will edge down in 1954, but because it stands so high wide leeway remains for sidelining much marginal labor without flying genuine distress signals. Panic publicity accorded layoffs even now cropping up will be baseless.

### Lose Here, Gain There

At first employment will not diminish in direct ratio to the slide in output. Made cost-conscious by intensifying competition, industry will prune overtime, the work-week before dismantling working staffs. Yet the net result of less overtime, lopping payrolls will be a decrease in consumer spending power—though not a serious one. (See Page 67). Because July's factory hiring rate was the lowest since 1949, employment seemed to have reached a static point, with the trend from now on apparently down.

Robbed of spending potential here, the economy will gain elsewhere. Death of excess profits tax, reduction of personal income taxes will generate about $8 billion worth of corporate, public spending power. Fractionally offsetting this increase will be higher social security payments.

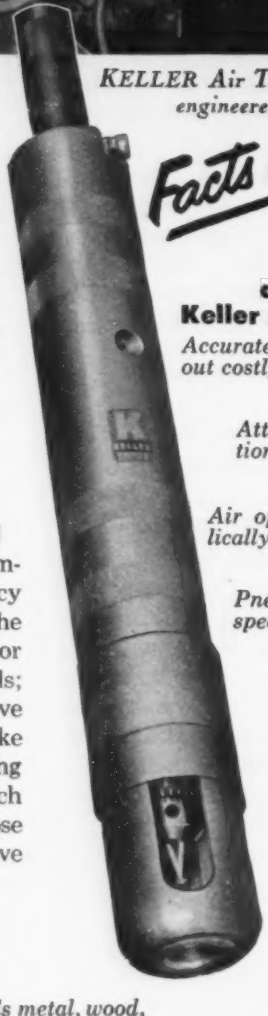
Reduction of excise taxes on selected products will give needed sales aid to some consumer durables



ANOTHER EXAMPLE OF *KELLER Air Tools engineered to industry*

# USE KELLER Airfeedrills for accurate automatic drilling

Keller Airfeedrills are recommended where extreme accuracy is needed, especially where the job cannot justify the space or cost of expensive machine tools; as in the case shown above where Keller Airfeedrills make the locating holes for machining jet engine parts . . . work which must be done to extremely close tolerances. Note the inexpensive fixture required.



*Used on close centers and in tight places*

*Easily shifted from job to job*

*Drills metal, wood, composition, plastics*

## Facts in Brief about Keller Airfeedrills

*Accurate holes without costly fixtures*

*Attaches in any position, at any angle*

*Air operated—hydraulically controlled*

*Pneumatic cycling to speed production*

Keller Tool Company, Grand Haven, Mich.

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but because Washington must balance its budget the tax load will be transferred to another source.

Paving a highway for adjustment is the fall of order backlogs. Contrary to the boom trend the unfilled order rate has submerged below the sales rate, ebbing 7 pct in 10 months. Aside from reflecting production catching up with demand, the drop highlights industry's transition to shorter-term buying based on abundance, competitive advantage. Purchasing prudence nicking order backlogs meanwhile yields a healthy inventory fluidity for industry facing production uncertainty.

When added to prospects of high sales, today's inventory caution makes mass inventory retrenchment unlikely. Recession is losing one of its most vicious allies.

August manufacturing inventories rose to $45.7 billion from July's $45.5 billion. Significantly, finished goods stocks rose proportionately higher than raw materials, reversing the boom pattern.

### Savings Rate Cushion

Popular bugaboo today is a large consumer installment debt of $21 billion, indicating bustling consumer optimism and de-fanged by a high income and personal savings rate. Yet a debt of this size is not ideal. While it built up the boom it has mortgaged future purchasing power more heavily than is usual.

Safety cushion is a substantial savings rate, running about 7 pct of disposable income while debt runs about 8 pct. Coaxing the dollars out of bank accounts with new products, promotion, attractive prices should be industry's objective.

Other positive factors next year will be heightened state and municipal spending on roads, schools, sewers, hospitals—projects which no longer can be neglected. Shortage excuses are gone.

What will it mean if our national product rate veers down from the current $370 billion? We thrived last year when the rate held at $360 billion and suffered no calamity when it stood at $280 billion before Korea.

# FOREMEN: Industry's Country Doctor

**Annual foremen's meeting points up role as link between management and labor . . . All-around men are needed, wanted . . . E. O. Seits re-elected president—By *K. M. Bennett.***

What labor relations seem to need is a country doctor. No specialists, just a country doctor who knows a lot of diseases and is always on the spot. And the company foreman seems to be the man with the right kind of medicine to relieve the modern workers' aches and pains.

If the handwriting on the wall hadn't been clearly legible in past years, this year's meeting of the National Assn. of Foremen at Milwaukee last week should have washed away all doubt. The 1200 plus foremen who convened there were deeply concerned with such "college seminar" topics as: human relations, economics of free enterprise, management development, methods improvement, communications between labor and management, what does your worker really think. The studies were taken seriously.

### Boost Production

Representing a total membership of 60,000 (and with a potential membership estimated at 30 times that figure), the association could already point to concrete results in putting foremen in a key position where labor relations need work. One plastics firm, through concerted effort by its foremen in their labor relations efforts, cut reject rates from 13 to 8 pct, a yearly saving of $600,000 for the parent company.

A Cincinnati foreman boosted his department's direct labor efficiency by 23 pct over a 2-year period. Another group of labor relations conscious foremen set up a factory materials conservation program that saved their firm over a million dollars in one year.

The Milwaukee conference wasn't concerned with reciting past accomplishments, however. Foremen heard strong talk, had the all-important labor relations problem laid squarely in their laps.

Today's foreman is not chosen for strictly technical background. The best milling machine man doesn't automatically oversee the milling department. Recent surveys indicate the foreman wanted most is the man who is good with machines, better at getting his subordinates to work with him.

The most sought-after foreman: (1) Seeks the good will of his employees; (2) consistently praises good work when he finds jobs being well done; (3) seeks to locate and fix problems of the humans in his command just as carefully as he goes after the machines in his department that are behaving in a cranky manner.

And, speakers pointed out, he realizes that the personnel department is upstairs and out of sight. The only man who knows and can correct actions of individual workers at individual machines is the man on the shop floor who is supervising actual work output. As one speaker bluntly put the problem, "Frankly, there's a shortage of that kind of man."

**"While there need be no decrease in emphasis upon personnel administration for workers and for middle and top management, there will be an increase in emphasis upon personnel administration for first-line supervision which will bring it into balance with the other two—and which will benefit all three . . . Fully qualified, well trained, hard-hitting, and effective foremen, with a deep appreciation of human values and great skill at securing high productivity and morale from workers, are a challenge of the future."**—Lawrence A. Appley, president, American Management Assn.

Recognizing the requirements of his position on the firing line of labor-management relations, today's foreman is boning up for the job ahead. Of 12 conferences conducted at the Milwaukee meeting last week, nine were directly concerned with better labor-management relations, and were aimed at briefing the foreman with problems and possible solutions for keeping his work crews well content and producing at a high rate.

### Human Relations the Key

One speaker pointed up the need for careful attention to the man at the machine with a recent redesign of a production line. A youthful engineer looked over one section of the assembly line, declared he could increase output of that section of the line by 20 pct with some minor changes. He had the changes made, but the output of the line never did climb. Reason: The men who were operating the machines on the line were the hold-up, not the machines.

Nobody was offering panaceas for upping output by offering figurative lollipops. But a few rules of thumb were suggested. The top producing worker is one who feels that his product is important. He knows where it will be used, and how much it is needed. He knows how his output, or lack of it, will affect the company that employs him, and feels the company needs the material he produces. He feels that he's being led, not driven. He feels that initiative or interest he shows will eventually give him a chance at a better job.

Besides studying the problem that has become largely their baby, the convening foremen found time to re-elect Edward O. Seits as their national president, choose Indian industrialist J. R. D. Tata as outstanding international management man for 1953.

# PLATING: Develop Better Process

**Experts thought it was a chrome finish—it was nickel . . . New process easier, cheaper . . . Minimum preparation needed . . . Tested in commercial plant—By *R. L. Hatschek.***

When plating experts mistake a nickel finish for chrome, you get the idea that it's a really bright nickel plate. And that's just what happened when Hanson-Van Winkle-Munning Co. showed platers some samples coated by the newly announced Nickel-Lume process.

### Have Two Solutions

Using conventional apparatus, the organic-type electroplating process with its improved bath formulas is said to yield an extremely bright finish at lower cost and with less difficulty of control than other commercially-available bright-nickel processes.

Installation and operating costs are both said to be lower. Equipment suitable for a Watts nickel bath and ordinary auxiliary equipment may be used. Heat demands may be as much as 25 pct lower, ventilation is not necessary and filtration may be either periodic or continuous, depending on which of two baths is used.

First bath contains an Anti-Pit agent for general use with moderate mechanical agitation. Operating ranges are: Temperature, 75 to 140 F (120 F normal); current density, 5 to 70 amp per sq ft (30 to 40 amp per sq ft normal). Conveyor motion or cathode rocker agitation is all that is recommended.

### List 10 Benefits

Type II bath is for high-speed air-agitated operation and requires slightly different conditions for best results: Temperature, 110 to 140 F; current density, 10 to 100 amp per sq ft (40 to 60 amp per sq ft normal). Continuous filtration is required with this bath.

Hanson-Van Winkle-Munning lists these benefits of the process:

(1) Fully bright deposits with pleasing color.
(2) Good leveling or smoothing properties.
(3) Wide temperature range with no brightness loss.
(4) Good corrosion resistance.
(5) Wide current density range.
(6) Ductile deposits with low compressive or tensile internal stress.
(7) Good tolerance to impurities.
(8) No activation of the nickel required prior to plating chromium or other deposits.
(9) Complete analytical control of all constituents.
(10) Stability over long periods of operation.

### Cite Low Cost Factors

High solution stability is cited as a major reason for low operating costs. Testing commercial application of the Nickel-Lume process, a 3200-gal bath was operated 8 hours daily, 5 days per week for 3 months in a fully automatic conveyor plating system. Cost of additional agents averaged only $4.60 per day.

Economies also result from minimizing pre-plating surface preparation and good finish without buffing or polishing. While the bath has good tolerance to impurities, most common purification methods may be employed where contamination reaches abnormal levels. Regular non-premium anodes are used.

### Could Drop Chrome

The process may be used wherever a bright, smooth, protective coating of nickel is needed on steel, zinc, brass, copper and aluminum. Nickel thickness for protective coating is the same with Nickel-Lume as with other processes.

If decoration is the only criterion, a thinner plate may be used. And the extremely bright finish of Nickel-Lume suggests the possibility of eliminating the final chrome plating entirely in many cases.

## Still Study Nickel Decontrol

Talk persists that mobilization officials will shortly announce a decision on decontrol of nickel. Indications over the weekend were that Office of Defense Mobilization was still studying the situation. Additional information is still being received, a spokesman says.

Some smaller firms are not anxious for decontrol. They fear they won't be able to compete in the market place with the industry giants for scant supplies of the metal. Prices for nickel scrap are still running higher than new nickel.

Meanwhile, the U. S. Office of International Trade has decided to limit fourth quarter exports to the same quotas as for the third. Total permissible exports for eight main categories are limited to 150,000 lb including 20,000 lb for new nickel catalyst.

In addition, 40,000 lb for welding rods and electrodes of not more than 60 pct nickel is allowed as well as 20,000 lb for reagent grades of chemicals and salts.

Spent catalyst containing not more than 10 pct nickel is permitted on an open end quota but is licensed with an eye to national security.

LONG, WET turnings being pushed into hopper, will be fed into crusher, emerge as uniform-sized chips and be blown into storage bin.

WITHIN MINUTES enough has collected in temporary bin to fill extractor basket. Chute is lowered, crushed chips pour into basket.

# Scrap:

**System doubles value, saves oil, ends handling problem.**

Aspirin wouldn't cure Hartford Machine Screw Co.'s scrap handling headache. But this semi-automatic salvage system did the job.

Capacity is 250 tons a month with no increase in the number of employees used in scrap handling. And the scrap, in the form of short, even-sized, dry chips, is worth double the price it would bring as oily, bushy turnings.

Add the savings made possible by reclaiming and purifying the cutting oil after it's been separated and the economies of the system grow.

An interesting feature is the method of moving the scrap in the process. Wet turnings are blown from the crusher to an intermediate storage bin by air at 8 to 10 oz pressure. From the oil extractor, the dry chips are blown a longer distance to outside bins by air at 1 lb 6 oz pressure. A total of 139 ft of 5-in. extra heavy black steel pipe makes up this portion of the system.

Steel and brass have separate storage bins. An automatic signal light tells the scrap crew when it's time to unload.

CHIPS go into extractor which will remove oil for reclamation.

OIL-FREE chips are fed into air ducts located under the floor.

PREMIUM grade scrap pours into gondola. Value has been doubled.

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The structural soundness and uniformity of Keystone "Special Processed" Cold Heading Wire is attained by careful selection of raw materials, our own exclusive drawing and heat treating process, rigid quality controls and inspections under the vigilant direction of Keystone's metallurgical staff.

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—International—

# CANADA: Steel

**Mills booked solid through 1953 . . . Sheet deliveries are 8 weeks behind schedule.**

While iron and steel supplies are gradually easing in the U. S., the same is not true for Canada. Across the border, mills are booked solid through the rest of this year and some industry spokesmen say backlogs of unfilled orders may extend through the first quarter of 1954.

There has been an easing in some steel materials, but in general supply is tight and new orders are being placed at a brisk pace. All types of flat-rolled products including heavy plates, hot and cold-rolled sheets and galvanized sheets are in short supply. Sudden improvement is not expected.

### Deliveries Lag

Plates continue under allocation and mill reps are making no prediction about when supply will get better. Pressure is as great as it has ever been during the last few years.

Mill deliveries of sheet products are running 6 to 8 weeks behind schedule. One producer of hot-rolled sheets who had been operating without allocation provisions during the second and third quarters has found it necessary to restrict acceptable tonnage for the fourth quarter in order to balance estimated production with delivery promises.

On some products this producer's cutbacks for the fourth quarter equal 50 pct of the tonnage placed during the third quarter.

### Pay More

Not helping the situation is the fact that Canadian production of primary iron and steel shapes for the first 4 months of the year was less than in the comparable period last year. Output for the January-April period in '53 totaled 1.62 million tons compared with 1.69 million tons last year.

There was an increase in shipments of primary iron and steel shapes for sale, however. In the 4 months ended Apr. 30 of this year shipments totaled 1,106,224 tons

## Squeeze Still On

compared with last year's 1,057,541 tons.

Though Canadian mills are not able to satisfy steel demand, consumers have little difficulty in obtaining urgent supplies, provided they are willing to pay higher prices for imported steel.

Easing of steel supply in the U. S. will no doubt result in an easier flow of steel into Canada.

### Electric Furnace for Zinc Melting

A new electric induction furnace for melting zinc sheets has been put in operation by Consolidated Mining & Smelting Co., Trail, B. C. Previously all zinc sheets were melted in oil-fired furnaces. Under the old method flue-gas carrying zinc oxide had to be treated to recover the metal, but with the new electric furnace this problem is reduced considerably since very little gas is generated.

The unit was designed and constructed by Societa Italiana Construzioni Elettrotermiche, Milan, Italy. Capacity is 300 tons per day.

In addition, Consolidated recently installed a Sheppard straight-line casting machine to cast finished zinc slabs. The machine, designed in England, is equipped with 140 molds.

### Germans Land New Steel Contract

With a contract to build a new steel plant in India already in its pocket, West Germany recently moved in on Pakistan's plans to become a self-sufficient iron and steel producer.

Pakistan hopes to have sufficient capacity for its domestic demand within 10 years. To carry out this program, it recently signed an agreement with the German Krupp works. Under the agreement, the German firm will build a steel plant with an annual capacity of 300,000 tons.

German engineers were expected to start surveying Pakistan's iron ore resources in the near future.


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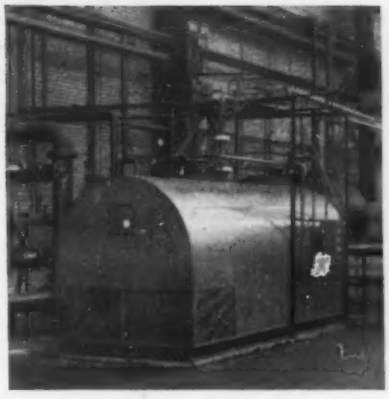

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# KOREA: How to Dig Out of Rubble

**Rebuilding plans prove major problem for Washington . . . Coordination with others is the key . . . Natural resources, labor no problem . . . Tools are—By *R. M. Stroupe.***

Activating plans for a rebuilt economy in war-torn Republic of Korea is proving a massive project for Washington policy-makers.

Prompt, intelligent outside aid is the vital requirement if the small nation is to become self-supporting, capable of maintaining its civilian and military forces on a level with Far Eastern standards. This is not disputed.

### Responsibilities Differ

The question now is one of coordinating an official U. S. reconstruction program with privately-supported activities, plus the Army operation called Civilian Relief in Korea (CRIK), plus United Nations' plans, plus the efforts of the Koreans themselves. Cooperation of the Seoul government in all these endeavors is essential to their overall success.

Running the show for the U. S. is the Foreign Operations Administration, in consultation with Defense and State Depts. In this fiscal year, FOA has been authorized to use $200 million to begin helping to stabilize Korean industry, commerce, agriculture.

FOA has responsibilities unlike those involved in the Army-run CRIK program, undertaken primarily to answer an immediate need for food and clothing. Confusion can also be avoided with UN reconstruction moves, which remain unpredictable. The UN voted $250 million for its work, but at that point action faltered.

Framework for FOA decisions was provided earlier this year in a report on Korea, ordered by President Eisenhower and performed by Dr. Henry J. Tasca, a specialist in economic problems. This report recommended a 4-year rehabilitation program at a cost of about $1 billion, of which the $200 million this year is the starter.

In addition, the report envisioned assistance by the ROK in balancing its budget and stabilizing its monetary system, and western help in developing technical and professional skills among the Koreans. It suggested that a shortage of engineering and mechanical training might be the "most serious factor" impeding rebuilding progress.

Less concern was expressed regarding the presence of raw materials or the potential labor force to operate mines, smelters, factories, and dock areas. These are accounted for, as is Korea's apparent incentive to climb up from its have-not status.

In the list of materials required by modern industry, tungsten, copper, lead, and zinc are located in both the ROK and Red sections of the mountainous peninsula. Even during the 3-year war which ended this summer, marked advances in tungsten production were made.

### Might Find More

Output grew from 1154 tons in 1951 to 3789 tons in 1952. By early 1953 the annual production rate was more than 5000 tons, which is not nearly the maximum that may be expected.

Deposits of columbite, beryl, gold, anthracite, and graphite are known to have considerable value. Iron and manganese are found at about the center of the west coastal region. It has been suggested that a "proper geological survey" probably would reveal commercial quantities of other raw materials.

Before fighting began in June 1950, U. S. Geological Survey had personnel in Korea, probing for new sources of metals and minerals and noting those spots where extraction would be practicable. Though the agency last week had not been called upon to renew its searches as part of the reconstruction program, it may yet be ordered to do so.

### Need Production Tools

Some problems in the ore production field are rooted in equipment and transportation difficulties. For example, a mine may now contribute little to the ROK economy because the miners have no pneumatic drills, and no track connects the site with the railway system.

Here's where western products

FOUR EXPLOSIONS leveled this brick building last week. It was a peroxide-producing plant of the Lucidol Div. of Novadel-Agene Corp.

and skills will be of immediate value. Imported pneumatic drills will raise ore output.

Engineers will direct the running of a spur track from the nearest rail line to the mine.

Attention is promised for the problem of insuring a smooth climb of industrial activity, once plant lines begin moving. Inept use of new machinery could cause depletion of materials stocks before they are replenished and a pile-up of finished items before distribution channels are operating smoothly. Insufficient amounts of raw materials actually on hand or on order would mean a stop-and-start output pattern.

Directing the revitalization of industry and commerce is one arduous task for FOA consideration. Another one, still being pondered, is that of placing orders for machinery and equipment needed in the ROK.

### Don't Like Japanese

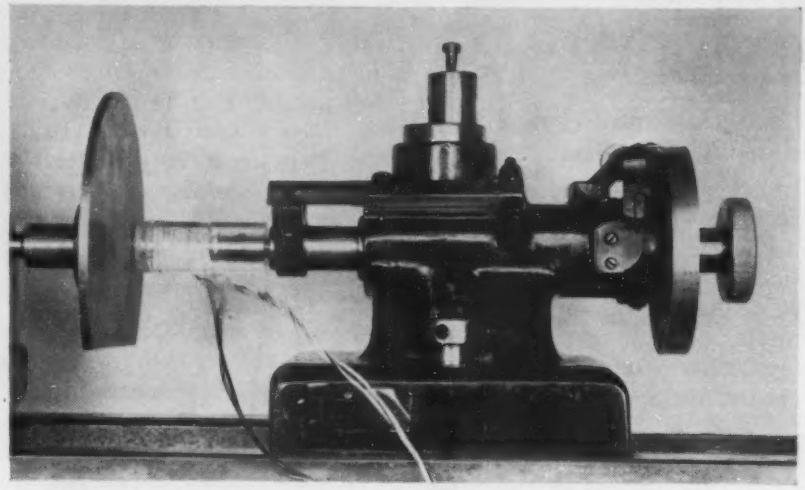
In Japan, there was much enthusiasm for the report that $200 million would be available for U. S. use before next July 1. It was felt there, and in some quarters in Washington, that a large amount would be spent for items of Japanese manufacture, as a means of keeping Japan's economy healthy.

The Koreans, sincerely hostile toward the Japanese, look with great disfavor on this possibility and may not be reconciled to the idea of employing machinery from Japan. This complication is a serious one for FOA hopes.

That agency isn't convinced by the recent announcement that Russia will help to rebuild North Korea. One view, though unofficial, is that the Reds will do no more than provide certain relief services and possibly re-establish power facilities in the Yalu area.

At any rate, FOA is keeping an eye on two possibilities which influence the Korean attitude toward rehabilitation: War might be resumed, despite the most strenuous efforts to prevent it; or the peninsula might be unified and thus attain an economic stature it does not now have.





MUTUAL INDUCTANCE micrometer in which alternating current fed into primary coil induces current in secondary. Variation of secondary current because of coil distance from conductive shield measures thickness of non-conductor between secondary and the metal shield.

## Out Goes the Yardstick

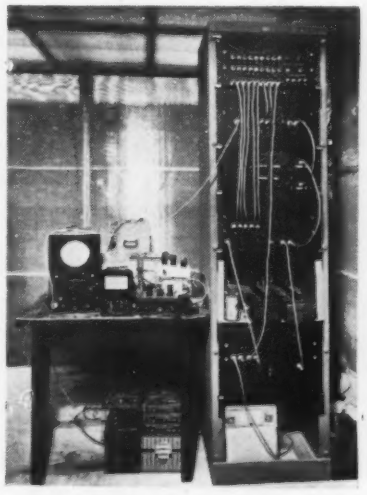
As modern science and industry advance together, new problems frequently arise—often in the field of measurement. In some cases new properties must be measured. In others, familiar ones must be gaged under "impossible" conditions or with unusual accuracy.

In 1950 the Bureau of Standards established the Office of Basic Instrumentation to gather information and do research along these lines. It has become a consultation center on problems of instrumentation for the laboratories of both government and industry.

Under its chief, W. A. Wildhack, OBI studies and evaluates new applications of physical principles to problems in measurement and control. Sponsorship of the group is by Office of Naval Research, Air Research and Development Command, Atomic Energy Commission and the Bureau of Standards.

Here's one sample of the type of work being done: OBI has developed an interferometer using electron beams to produce interference fringes much as optical interferometers use light beams. This instrument, which resulted from research on wave properties of electrons, greatly extends the range of light interferometers in the direct measurement of length.

More than that, the instrument also provides a sensitive means of measuring gradients of magnetic and electrostatic fields. Other possible uses include methods of studying the wave nature of the electron, energy levels in solids and an absolute determination of Planck's constant.



THERMAL noise thermometer gages temperature of heat-caused electrical disturbances in electronic circuit.

# Missiles:

**Have progressed enough to close special office.**

Guided missiles development is sufficiently well advanced to warrant closing of the Defense Dept. guided missiles office, according to K. T. Keller, who recently resigned as director of the office to return to his post as chairman of the board of Chrysler Corp.

His work, he says, can be handled in the "regular administrative and planning" offices of the military establishment, now that there are "several guided missiles already in production, others relatively far advanced . . . and some in the early stages of research."

### High Explosive Work

As Mr. Keller left the Defense Dept., Dr. Robert W. Cairns was named Deputy Assistant Defense Secretary for research and development. He will serve with Donald A. Quarles, Assistant Defense Secretary in these fields.

Dr. Cairns has done important work in the technology of high explosives and propellants and in chemical engineering. During World War II he was a consultant to the Office of Scientific Research and Development.

In July, 1949, Dr. Cairns became a member of the panel on ammunition and explosives of the former Defense Dept. Research and Development Board. He held the position of vice-chairman of the board from last January until June 30, when it was dissolved.

## AEC Extends Uranium Incentives

As additional incentive for development of potential uranium ore sources, the Atomic Energy Commission last week extended the expiration dates of its guaranteed price and bonus payment programs.

Circular 5, which provides guaranteed minimum base prices for uranium oxide content of carnotite-type and roscoelite-type ores of the Colorado Plateau, has been extended to Mar. 31, 1962.

Price schedules range from $1.50 to $3.50 per lb of uranium content, depending upon grade, plus certain allowances and premiums.

Circular 6, covering bonuses for new initial and some other production from domestic mines, has been extended from 1954 until Feb. 28, 1957.

Incentive payments ranging from $1.50 to $3.50 per lb are made on acceptable ores from newly developed mines, up to and including the first 10,000 lb of initial production.

MAUCH CHUNK, coal region town, is promoting new industry. Residents kick in with a nickel a week. Five years should bring $78,000—enough for a plant site.

## Army Posts to Buy from Civilians

Army posts will follow a new plan prescribing the buying of certain civilian-type items, not yet named, through nearby retail outlets rather than through military depots.

This decentralization action will apply to spot purchases of relatively low-priced goods which could not be requisitioned through channels in an economical or efficient manner. It is expected to produce savings by cutting down depot workloads and lowering stock level requirements.

The various technical services responsible for operating supply depots will issue lists of items which post commanders may buy locally.

These services include Corps of Engineers and the Signal, Ordnance, Chemical, Transportation, Quartermaster, and Medical Corps.

## Set Cobalt, Moly Export Quotas

Fourth quarter export quotas for cobalt and molybdenum have been set at about the same levels as the third quarter although slightly higher shipments of cobalt chemicals will be allowed.

Cobalt shipments for welding rods and wires will still be held to 7000 lb and for dental alloys, 1800 lb. Quota for cobalt chemicals has been raised to 5000 lb.

## Contracts Reported Last Week

**Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.**

Replenishment of tank & combat vehicle parts, 8000, $40,744, General Motors Corp., Pontiac, Mich., *J. P. McManus.*

T-29C trainers, 5, $750,000, Consolidated Vultee Aircraft Corp., San Diego, Calif., *R. M. Modisette.*

Simulator, lot, $392,425, Westinghouse Airbrake Co., Swissvale, Pa.

Station assy, slight, nose, 15 ea, $767,836, Eastman Kodak Co., Rochester, N. Y., *H. B. Collins.*

Radio attachment, 128 ea, $632,414, Link Aviation, Inc., Binghamton, N. Y.

Indicator, straight line, 5 ea, $195,160, Vectron, Inc., Waltham, Mass.

Engine generator, 47 ea, $179,979, Kohler Co., Kohler, Wis.

Ditching trainer, 65 ea, $37,668, The Austin Co., New York.

Body, 37000 ea, $47,985, Standard Coil & Mfg. Co., Pittsburgh.

Railway car, box, 320 ea, $2,040,000, Pullman-Standard Car Mfg. Co., Chicago.

Replenishment of vehicles, 161, $497,620, Eidal Mfg. Co., Albuquerque, N. M.

## Where Quality Production is a "Must"...

# ALAN WOOD'S

## 30" STRIP MILL

The Alan Wood 30" continuous strip mill continues to produce plates, sheets, and strip at a high speed consistent with top quality.

To serve you better, we are continuously working to expedite production and shorten delivery cycles.

Strip, sheets and plates are only a few of the many products of Alan Wood Steel Company. In *all* of them, our mine-to-mill-to-market program helps to maintain highest standards despite accelerated production.

*Over a Century and a Quarter of Iron and Steel Making Experience*

# ALAN WOOD STEEL COMPANY

**Conshohocken, Pennsylvania**

Ivy Rock, Pa. • Swedeland, Pa. • Dover, N.J. • Oxford, N.J.

FAST SERVICE on

Large CUT Gears

Simonds Gears

• Spur • Bevel
• Mitre • Worms
• Worm Gears
• Racks • Pinions

With the experience of more than 60 years of gear-making specialization . . . Simonds is geared to give you fast, custom service in diameters up to 145". Count on Simonds for quick delivery on gears for new equipment . . . for special machinery . . . for repairs and replacements.

SIMONDS also is stock carrying distributor for Ramsey Silent Chain Drives and Couplings; and industrial V-Belts.

SIMONDS GEARS

THE SIMONDS GEAR & MFG. CO.

LIBERTY at 25TH PITTSBURGH 22, PA.

# Industrial Briefs

**New Prexy** . . . THE AMERICAN MACHINE TOOL DISTRIBUTORS ASSN. has elected Thomas R. Rudel, president of Rudel Machinery Co., Inc., New York, its president.

**Midwest Office** . . . ARTHUR D. LITTLE, INC., Cambridge, Mass., will open a new midwest liaison office in the Board of Trade Bldg., Chicago. John R. Kirkpatrick will be manager.

**New Arm** . . . WARNER ELECTRIC BRAKE & CLUTCH CO., Beloit, Wis., has named the George J. Fix Co., Dallas, southwestern distributor for its Industrial Div.

**Gets Orders** . . . RYAN AERONAUTICAL CO., San Diego, has received over $2 million in orders from Boeing Airplane Co. for external wing tanks for Boeing KC-97 Stratofreighters.

**New Approach** . . . PURDUE INSTITUTE FOR PACKAGING PERSONNEL, Lafayette, Ind., will hold its first of three 4-week sessions from Sept. 28 to Oct. 24. The other sessions will continue to Jan. 30, 1954.

**Going Up** . . . LURIA ENGINEERING CO., Bethlehem, has been awarded a contract to construct a 19,600-sq-ft fireproof steel building for the Lindgren Foundry Co., Batavia, Ill.

**Encouragement** . . . ARMCO STEEL CORP. is offering this year a new type of award for high school students to encourage them to be self-reliant. Awards will go to graduates of the three high schools in the Middletown, Ohio, area. W. W. Sebald, president of Armco, conceived the idea and will personally contribute funds to make it possible.

**Announcement** . . . ALLEGHENY LUDLUM STEEL CORP. has moved the offices of certain of the industrial relations staff to the Henry W. Oliver Bldg., downtown Pittsburgh, joining the other executive offices of the company.

**Office Opened** . . . LAUBE STEEL CO., Chicago, has opened a sales and engineering service office in the Keith Bldg., Dayton.

**Appointed** . . . BAKER-RAULANG CO., Cleveland, has appointed Industrial Truck Sales, Inc. as representatives for Baker industrial trucks and cranes in western New York State.

**Hear Ye** . . . SOCIETY FOR APPLIED SPECTROSCOPY will hold its October meeting Sunday, Oct. 6, at the Hotel New Yorker, New York City.

**Shipped** . . . HEWITT ROBINS has shipped the first iron ore blending and reclaiming system ever to be built for the Far East steel industry to Japan. It will become part of the new plant of the Kawasaki Steel Corp. at Chiba City.

**Joint Display** . . . ROCKWELL MFG. CO.'s Drill Unit and Delta Power Tool Divs. will enter a joint display of latest models of metalworking equipment at the National Metal Exposition in Cleveland, Oct. 19-23.

**Savings Bonds** . . . Number of REPUBLIC STEEL CORP. employees buying U. S. Savings Bonds on the payroll savings plan increased to 97 pct from 30 pct as a result of a week-long drive.

**In Agreement** . . . ALUMINUM CO. OF AMERICA, Pittsburgh, reports that an agreement with the United Auto Workers (CIO) on a new contract covering about 5000 workers at four plants had been ratified by the local unions.

**Distributor** . . . A. O. SMITH CORP., Milwaukee, has appointed U. S. Steel Supply Div., U. S. Steel Corp., Chicago, distributor for its welding products in the West Coast area.

**Engaged** . . . Chemical Plants Div., BLAW-KNOX CO., Pittsburgh, has been engaged by the Oklahoma State Planning & Resources Board to conduct a survey of the state's natural resources and market potentialities and compile the facts for use by the board.

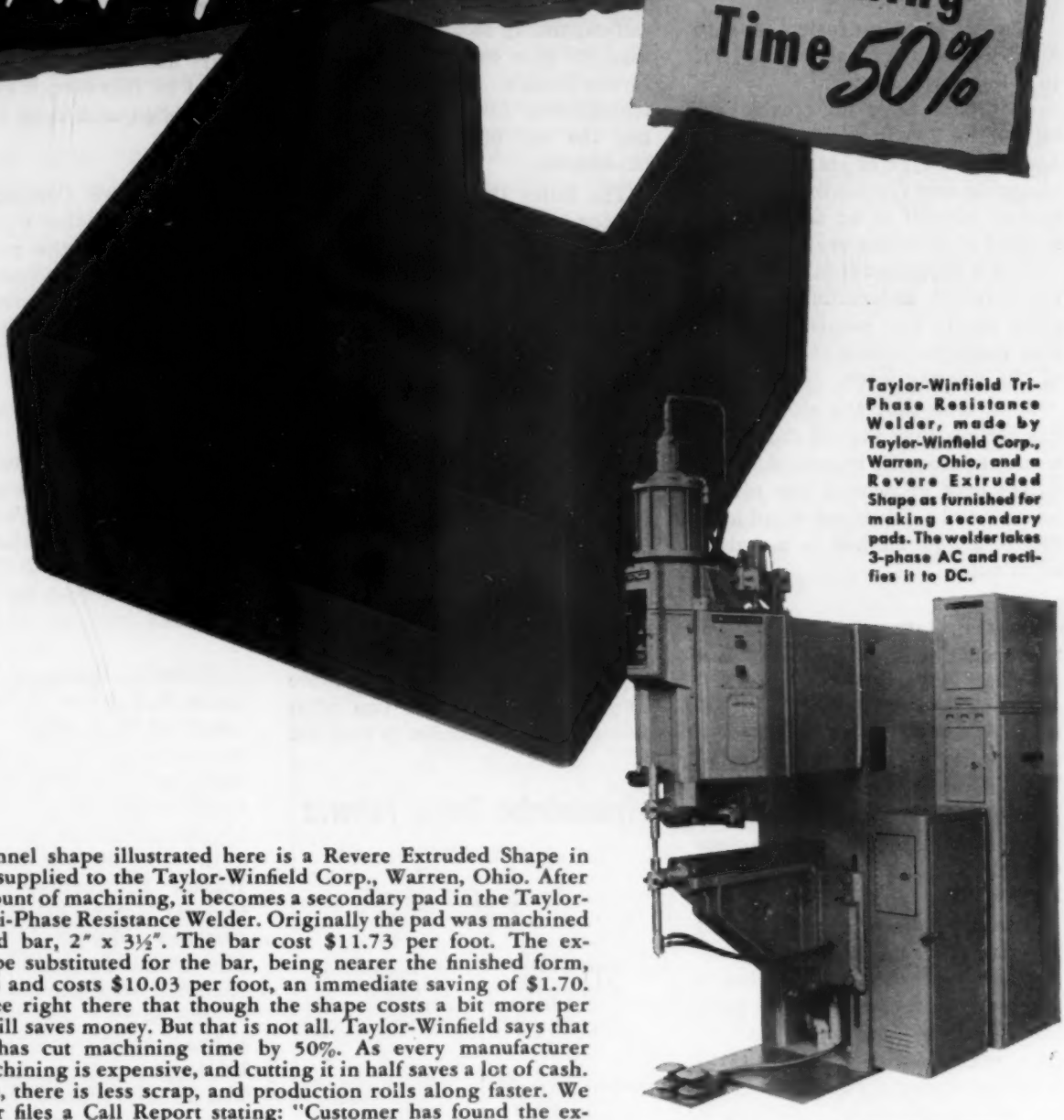
**Division** . . . IPSEN INDUSTRIES, INC., Rockford, Ill., has opened a new sales and service division in Plainfield, N. J. Alfred E. Stone is sales engineer at the company's new headquarters.

**Expansion Program** . . . L. B. FOSTER CO., Chicago, has completed a major expansion program at its plant in the Clearing District in Chicago. New facilities will increase substantially the company's pipe fabrication capacity.

# REVERE

## Extruded Shape SAVES $1.70 per foot...

## CUTS Machining Time 50%



Taylor-Winfield Tri-Phase Resistance Welder, made by Taylor-Winfield Corp., Warren, Ohio, and a Revere Extruded Shape as furnished for making secondary pads. The welder takes 3-phase AC and rectifies it to DC.

• The channel shape illustrated here is a Revere Extruded Shape in copper, as supplied to the Taylor-Winfield Corp., Warren, Ohio. After a small amount of machining, it becomes a secondary pad in the Taylor-Winfield Tri-Phase Resistance Welder. Originally the pad was machined out of solid bar, 2" x 3½". The bar cost $11.73 per foot. The extruded shape substituted for the bar, being nearer the finished form, weighs less and costs $10.03 per foot, an immediate saving of $1.70. You can see right there that though the shape costs a bit more per pound, it still saves money. But that is not all. Taylor-Winfield says that the shape has cut machining time by 50%. As every manufacturer knows, machining is expensive, and cutting it in half saves a lot of cash. In addition, there is less scrap, and production rolls along faster. We have in our files a Call Report stating: "Customer has found the extruded section very satisfactory, and bases his machining time-saving on production runs and not estimates."

Credit for this fine achievement has to be shared by a number of people, both in Taylor-Winfield and in Revere. Our Sales and Technical Advisory staffs collaborated closely with the customer's engineering, production and purchasing personnel. Everybody considered all angles, and worked out this money-saving plan.

So we suggest that if you are doing any extensive machining of copper and copper alloys, or aluminum alloys, it would be a good idea to look into Revere Extruded Shapes. They might offer you important economies. We will be glad to consult with you. Just get in touch with the nearest Revere Sales Office.

**REVERE**

**COPPER AND BRASS INCORPORATED**

*Founded by Paul Revere in 1801*

230 Park Avenue, New York 17, New York

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*Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N.Y. Sales Offices in Principal Cities, Distributors Everywhere.*

**SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS**

# Shiftless Cars Bring Back Confusion

**Seven distinct selector patterns exist in automatic transmission types . . . Will a standard evolve as it did before? . . . Firms differ on what's best—*By R. D. Raddant.***

A chapter of confusion in auto history is being repeated today, but in a less serious form.

Oldtimers have no trouble recalling the Twenties when each car had its own type of shift. A driver changing cars frequently had to accustom himself to an entirely new method of changing gears.

This is paralleled today when seven different automatic transmissions are in use, requiring almost that many variations of movement of the selector lever.

It is true that the situation is less serious than that of the Twenties. An automatic transmission requires only infrequent use of the selector and a driver can adapt himself to a new method in a matter of minutes.

**Four Patterns . . .** Two basic movements required to manipulate the selector lever result in the variations of pattern. One is the right-left movement in moving the selector through its basic positions as lettered on the indicator. The other is the forward and back motion guiding the lever through the steps of each position. This is known as "gating."

Selector indicators have evolved into four different patterns, depending on whether a park position is used and whether the reverse position is at the left or right. All four variations can be traced to combinations of these two points.

**Reversed Reverses . . .** For example, Chrysler's PowerFlite, newest of the automatic transmissions, has only four positions on the selector indicator as does General Motors' Hydra-Matic. But on PowerFlite reverse is on the left and on Hydra-Matic it's on the right. Chrysler relies on its independent self-expanding handbrake for parking, the only one in the industry. Hydra-Matic's reverse locks the transmission for parking, and also has the use of the conventional handbrake.

The Buick Dynaflow selector indicator has a park position on the extreme left, reverse at the extreme right. This indicator pattern is carried through Chevrolet's Powerglide, Packard's Ultramatic and Studebaker's transmission.

The fourth basic indicator is that used in Fordomatic and Mercomatic, with park at the extreme left and reverse second from left.

**More Disagreement . . .** The second basic conflict, in addition to whether a park position should be used, is directly attributed to the relative position of low to reverse. This is important for "rocking" the car in slippery weather. More transmissions have the two adjacent and the contention is that the short motion is easiest. But Chrysler contends that because of the gating and positions of the two at opposite ends of the scale, it can be shifted easily without looking at the indicator.

Chrysler also claims that its PowerFlite is closest to the familiar pattern of movement of a standard shift and therefore more easy to adapt to. However, it's all a matter of opinion and each has its own points.

**A Standard Coming . . .** The question is whether a standard will ever evolve. At the moment there is no official movement in that direction, although some unofficial trial balloons are being sent up. But new and improved transmissions are continually being developed and a trend to one type may follow.

In the Twenties, Buick was the last to hold out before adopting the standard shift. Buick's pattern was just reversed from left to right from the standard. Dodge, another long holdout, had its pattern rotated 180°.

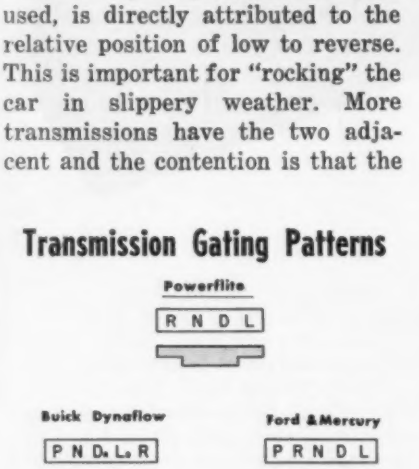
**Friendly Dig . . .** When Benjamin F. Fairless, chairman of the board of U. S. Steel Corp., spoke to the Detroit Economic Club last week, he faced an audience that included most of the top automen, his biggest customers.

In fact, he was introduced by Harlow H. Curtice, president of General Motors, his biggest single customer, who got in a sly dig at Mr. Fairless' expense over the changing steel market.

"We haven't seen much of Ben in the last few years, but I wouldn't be surprised if we saw more of him in the future," he said. "In fact, I wouldn't be surprised if he had his order pad in his pocket right now."

**"Oasis of Optimism" . . .** But in the contrast to what the auto industry usually expects from steel, Mr. Fairless returned some of the same kind of talk the auto industry likes, chiding "prophets of doom"

## Transmission Gating Patterns




LETTERS show selector patterns of the seven automatic transmissions now in use. Shaded areas are diagrams of gating patterns indicating steps selector levers must follow to move into different positions.

and warning that the country can "predict" itself into a recession.

He told the happy Detroiters their city was an "oasis of optimism" where the industry "goes right on making more and more cars while your customers go right ahead buying them."

# Annual Wage:

**Management "inducement" is new twist on old pay plan.**

A new angle on the UAW's concept of an annual wage came out last week under the label of an "inducement" to management. It was coupled with a pledge, or threat, by UAW (and CIO) president Walter Reuther that "we won't sign any new contracts until workers are paid by the year."

The "inducement" factor was explained by one labor attorney before the Michigan State Bar as relating to unemployment insurance received by a laidoff worker. In other words, under this hypothetical plan the company would have to pay the difference between unemployment benefits and his guaranteed rate.

The annual wage is an old thing to the auto industry and has been continually discounted as absolutely impractical. However, Mr. Ruether and his lieutenants have made it plain that it will be their issue in 1955 when escalator clauses with auto companies run out.

But the "inducement" to management under which the state would subsidize a layoff seems to be a new twist.

## Adds Low-Priced Luxury Line

Hudson will lead off the new model introductions with its 1954 lines of Hudson Hornet, Wasp, Super Wasp, Jet, Super Jet, and Jet-Liner cars making their first official appearance Oct. 2.

In appearance, the lines have received a major face lifting giving the cars longer, lower look. Engine compression ratios and horsepower have been increased throughout the model line resulting from a redesigned combustion chamber.

The Jet-Liner is a new model in the Jet line, a luxury type which is a tip-off of what to expect in the 1954 model year. The addition of a luxury model will be general throughout the industry in the low price range as manufacturers try to extend their lines upward a notch.

The trend has been underway for some time, but was generally confined to one model, usually a hardtop, until Chevrolet brought out its BelAir line last year.

**Automotive Production**
*(U. S. and Canada Combined)*

| WEEK ENDING | CARS | TRUCKS |
|---|---|---|
| Sept. 26, 1953.. | 114,647* | 23,936* |
| Sept. 19, 1953.. | 122,537 | 24,375 |
| Sept. 27, 1952.. | 110,145 | 31,083 |
| Sept. 20, 1952.. | 115,590 | 32,158 |

*Estimated: Source *Ward's Reports*

## Why Fire Beat Fighters

Now that the smoke has settled, the official investigation of the Detroit Transmission fire shows an incredible chain reaction that doomed the building in 5 minutes after sparks from a welder's torch ignited oil in a drip pan.

A contractor's employee, armed with a 20-lb $CO_2$ extinguisher was standing by the welder. This extinguisher and two others were poured on the blaze in the trough, more than 10 ft above the floor level. Two 150-lb dry extinguishers were also emptied on the blaze.

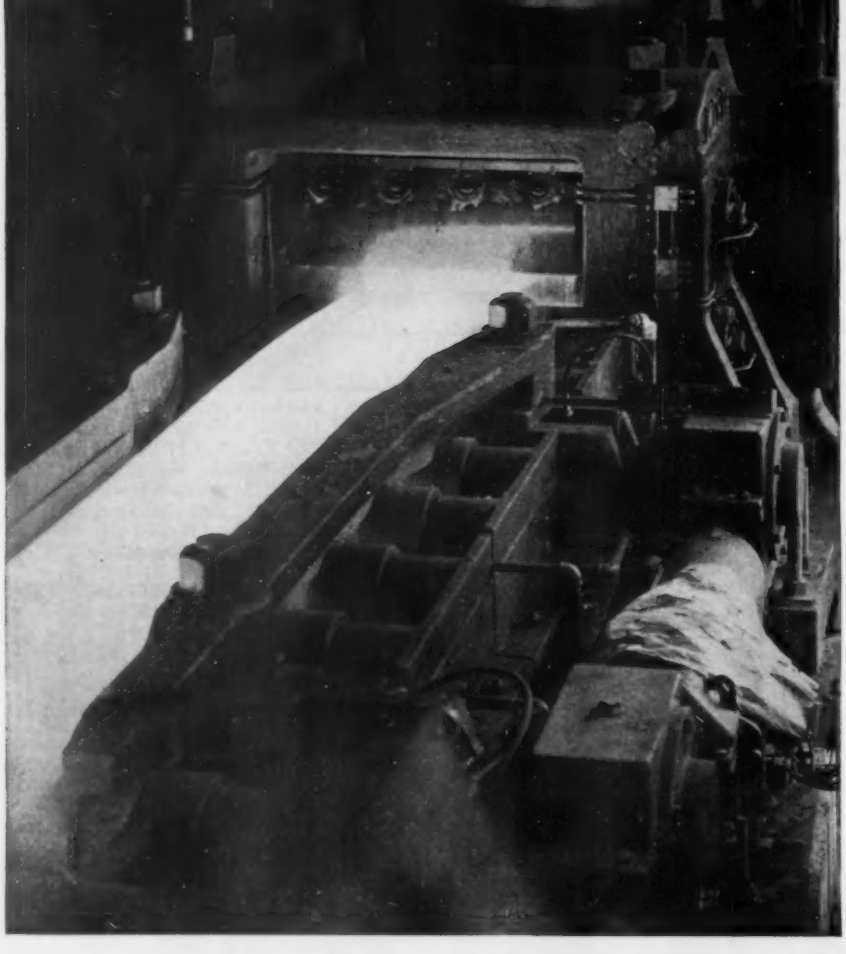
As it was about under control, inflammable material in the roof was ignited and burning tar poured into the fire. At the same time the electric circuit to the exhaust fans was shorted and thick smoke filled the plant. Decision had to be made to fight the fire in the thick smoke or evacuate the plant. Employees were ordered to safety, thereby saving countless lives.

Extinguishers in the drip storage tank functioned satisfactorily and the fire did not spread in the first moments. Explosions and rapid spreading followed the roof collapse and power loss.

**THE BULL OF THE WOODS** — By J. R. Williams

TAKE A HALF INCH OFF THIS SHOULDER, BURT, AND I'LL HAVE HANSEN THREAD IT, AN' DAN MILL TH' KEYWAYS, AN' MORTON POLISH IT UP!
NOT SO LONG AGO ONE GUY WOULD AND COULD DO THAT WHOLE THING HIMSELF! THIS SURE IS THE DAY OF SPECIALISTS!
YEH, AN' YOU GOT TO HAVE A SPECIALIST TO FIND OUT WHAT SPECIALIST YOU NEED! LIKE A PAIN IN TH' LEG--YOU GOT TO GET A LEG SPECIALIST, BUT WHICH--A RIGHT OR LEFT LEG SPECIALIST? OR UPPER OR LOWER LEG ?
THE RUNAROUND
10-2 J.R.WILLIAMS
Copr. 1953 by NEA Service, Inc. T. M. Reg. U. S. Pat. Off.

# SAVE A MILL A POUND . . . EARN AN EXTRA $2 A TON



A saving of only a mill per pound on the cost of rolling steel, adds up to an extra profit of $2.00 per ton. One way you can make this saving is to see that your equipment runs without unnecessary interruptions or slowdowns. And here Texaco can help you greatly.

First of all, Texaco has *a complete line* of steel mill lubricants . . . designed to assure you smooth, uninterrupted operation . . . longer life for all your machinery and equipment . . . lower maintenance costs.

Then there is Texaco Lubrication Engineering Service rendered by men trained and experienced in steel mill operations . . . men qualified to help you in many cost-saving ways beyond the mere recommendation of lubricants.

Let us show you how you'll benefit by teaming up with Texaco. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

**TEXACO Lubricants, Fuels and Lubrication Engineering Service**

# Ike Mum on Taft-Hartley Changes

**Despite union efforts to get Ike to tip his hand, he remains silent on the labor law and a new Labor Secretary . . . List four broad objectives—*By G. H. Baker.***

Labor union sniping at the White House over proposed Taft-Hartley changes fails to draw return fire from President Eisenhower.

Efforts to get him to tip his hand on how the labor law should be rewritten, and to force a hurry-up announcement of his new choice as Secretary of Labor are drawing blanks. Insiders believe the Cabinet post will continue to remain vacant for several more weeks—or at least until the AFL and CIO national conventions have adjourned.

**Play It Close . . .** Union officials are putting in plenty of overtime in attempts to force a fresh disclosure of Administration strategy as to Taft-Hartley revision. But the White House is playing a tight-lipped game. Its labor advisors got their fingers burned back on Aug. 3, when plans for rewriting the Taft-Hartley law in 19 major respects were divulged on Capitol Hill. They see no reason for setting up ready targets for union marksmen to shoot at.

President Eisenhower made it clear last week that he would send to Congress in January—not before—his recommendations for correcting "a number of defects" in the Taft-Hartley law. In a personal message (delivered by Vice-President Nixon) to the AFL convention in St. Louis, Mr. Eisenhower listed four broad objectives of the Taft-Hartley study now being conducted by a combined labor-management-public group:

(1) To remedy defects which caused concern on the part of workers over possible uses of the law to the detriment of their welfare.

(2) To insure efficient, speedy, and impartial administration of the law.

(3) To permit healthy growth of labor unions, while respecting the legitimate rights of individual workers, their employers, and the general public.

(4) To lessen government interference in labor-management matters.

**Didn't Like It . . .** AFL convention delegates in St. Louis made it clear to Mr. Nixon that the White House message was not acceptable to them. They refrained from applause—with one exception—throughout the reading of the message. (The exception: If the Administration "serves the greedy few, as has been charged, it will lose the election in 4 years.")

**More Conservative . . .** Wide-open industrial expansion plans that marked U. S. entrance into two wars in the 10-year period 1941-1951 are to be avoided in any future all-out mobilization program.

Administration leaders, surveying the reports of waste and inefficiency that resulted from grandiose armament planning following Pearl Harbor and again following the start of the Korean war, are determined to avoid any such costly pitfalls in another shooting war.

When the Korean war started, for example, Washington planners insisted upon a 1000-unit-per-day capacity for a particular arms plant. When construction of the plant began, the government had cooled off enough to cut capacity to a projected 400 units per day. Biggest contract the plant ever received was for 150 units per day, and current operation is at the rate of 75 units per day.

**Odds Are Good . . .** Lead and zinc industry's bid at Seattle (American Mining Congress convention) for restrictions on imports stands a good chance of winning congressional approval next year.

President Eisenhower is on record as stating that a strong domestic industry is "vital to na-

MARTIN DURKIN greets Welfare Secretary Oveta Culp Hobby at national AFL convention as Secretary of State Dulles and Al Hayes, Machinist's Union President look on.

# BEND LARGE STRUCTURALS, OTHER SHAPES at cost-cutting speeds

## —with this "Buffalo" No. 4 BENDING ROLL

| SHAPE | MAX. SIZE |
|---|---|
| 1. Angles—leg out | 8 x 8 x 1 |
| 2. Angles—leg in | 8 x 8 x 1 |
| 3. Beams on flanges | 15″ — 60# |
| 4. Channels—flanges out | 15″ — 55# |
| 5. Channels—flanges in | 15″ — 50# |
| 6. Flats on edge | 8 x 1½ |
| 7. Flats on flat | 12 x 3 |
| 8. Rounds and squares | 5 — 4½ |
| 9. Standard st. pipe | 8 |
| 10. X heavy pipe | 6 |
| 11. XX heavy pipe | 5 |

**Other Advantages in using "Buffalo" BENDING ROLLS**

- Quick roll changes—little time loss between runs
- Almost unlimited variety of shapes can be bent
- Easy operation—quick release of finished work
- Horizontal or vertical models to fit your operation
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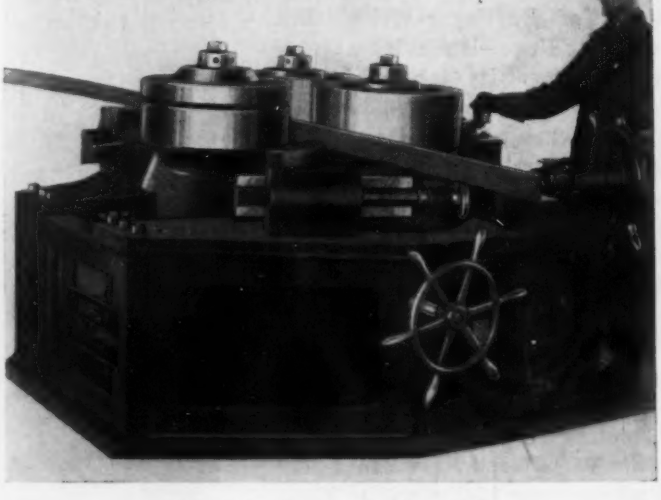
WRITE FOR ENGINEERING BULLETIN 352-C for all construction details as well as minimum diameters and all capacities. If you bend metal, you'll do it cheaper with a "Buffalo" Bender!



*No. 3 Horizontal Bending Roll*

"Buffalo" MACHINE TOOLS

**BUFFALO "Buffalo" FORGE COMPANY**

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Canadian Blower & Forge Co, Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

tional security and to the continued prosperity of our country."

In addition, mining-state senators and representatives are virtually united in their stand that positive action of some sort must be taken to assure the continued operation of western mines. Senate Finance Committee has asked the U. S. Tariff Commission to report by Mar. 31 on the effects of lead and zinc imports upon the domestic industry.

**Trim No More . . .** Navy's decision to assign construction of new ships to private yards, rather than to its own installations, won't result in any big layoffs of government ship builders. Rebuilding and conversion jobs are to be assigned to government shipyards in sufficient volume to keep activity up to its current level.

Nearly 14,000 government shipyard workers have been trimmed from federal payrolls this year. Navy announcement that it would contract all new ship construction to private yards raised fear that the firing ax would be wielded again. Not so, says Rear Admiral Wilson D. Leggett, Jr., chief of the Navy Bureau of Ships. No further cuts in naval shipyard employment are planned. Conversion jobs, plus normal maintenance, are to keep employment fairly constant from here on.

AT BANKERS' CONVENTION President Eisenhower chats with Treasury Secretary Humphrey (center) and Merle Selecman, executive manager of the American Bankers Assn.

# Freight Rates:

**ICC expected to OK equalized rail rates for imported ore.**

Interstate Commerce Commission is expected to approve shortly an examiner's finding that imported iron ore rail freight rates from eastern Atlantic ports should be equalized to steel mills in West Virginia, eastern Ohio, and western Pennsylvania.

Basic rates from Baltimore have been 20¢ a ton below rates from Philadelphia and 60¢ less than from New York and Boston.

Confirmation of the examiner's finding would mean that parity rates from the four ports would be established on the Baltimore basis—ranging from $2.31 to $2.71 per ton of iron ore in shipments.

Apparently a rate war has been headed off. Application had been made by New York Central, Pennsylvania, and the Erie Railroads to reduce their imported ore rates from the three northern ports to the Baltimore rate.

Western Maryland and the B & O immediately moved to reduce rates from Baltimore in order to preserve the 20¢ differential from Philadelphia.

Counter-move by the Pennsy would have been to cut still more than already proposed for Philadelphia and Baltimore.

Examiner's decision is to allow the original proposal as justified but to reject proposals for further cuts in the Baltimore rate.

Traffic at stake is considerable. Volume moving from eastern ports has increased fourfold in recent years, running currently above the 10,000,000-ton level. Estimates are that the figure will increase to 20,000,000 tons in a couple of years.

## Senate Scrap Hearing Starts

Industry spokesmen were the first witnesses scheduled to appear this week at Senate Small Business Subcommittee hearings on the extent of military competition with civilian operators of aluminum scrap processing plants.

Scrap dealers complained earlier this year (THE IRON AGE, July 16) that the armed services are invading the private enterprise field by running aluminum sweating furnaces and processing facilities. Plenty of capacity exists in civilian plants, it's claimed.

# Lead, Zinc:

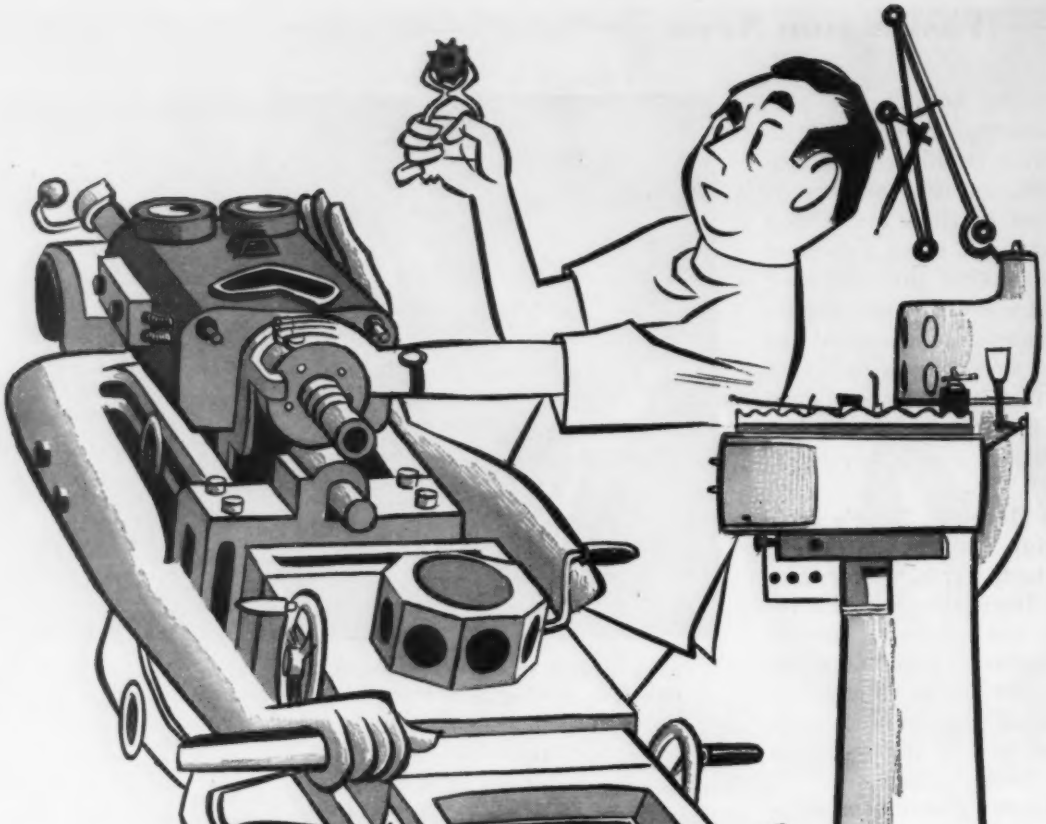
**Study effect of imports on U. S. mining industries.**

Last week the U. S. Tariff Commission quickly instituted an investigation with respect to lead and zinc imports and their impact on domestic industries.

Action was taken 2 days after receipt of the petition by the National Lead & Zinc Committee which complains that the metals are being imported in such quantities as to drive down prices and cause serious injury to domestic industry.

Public hearings are scheduled to open in Washington on Nov. 3 for lead, while zinc comes up for discussion on Nov. 5.

In connection with the petition, the industry committee has recommended a 50 pct increase in import duties over those in effect on Jan. 1, 1945.



# *It hurts twice as much today!*

**Double reason why you need Correct Lubrication!**

Look up some of your bills for machine repairs during the last so-called "normal" year. *You'll be surprised!* The ring gear that cost you $83 to replace in 1939 now costs $165. A thrust bearing that cost $44.35 now runs $88.73. A millwright's hourly rate in 1939 was 70¢. Now it is $1.56 per hour.

Yes, it sure hurts twice as much today to pay for machine maintenance—*double* reason why you need a program of Correct Lubrication! Such a program assures your use of the right oil or grease for every part of every machine . . . thus steps up machine efficiency—keeps repairs and downtime to an absolute minimum.

Why not get a program of Correct Lubrication started in *your* plant? Call your Socony-Vacuum representative!

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*Correct Lubrication*

**First step in cutting costs!**

# Smogless Electric Furnace Passes Test

**Smog control equipment on Bethlehem-Pacific electric furnace will get permit . . . Many handicaps overcome . . . Final unit runs at over 90 pct efficiency—By T. M. Rohan.**

The smogless electric steelmaking furnace became a reality in Los Angeles last week.

After 4 years of work and over $500,000 spent to meet the requirements of the powerful Los Angeles County Air Pollution Control District, Bethlehem-Pacific was on the verge of getting its official permit.

District Director Gordon P. Larson told THE IRON AGE that the control equipment had passed all inspections and the permit "would be granted in a matter of days." Only a few minor operational problems were still to be cleaned up, he added. Mr. Larson praised Bethlehem-Pacific, "which has sincerely cooperated at considerable expense in the face of many disappointments and has made a marked contribution to know-how on the subject, especially on the problem of hooding."

*(Ed. Note—A complete technical description of engineering details in the Bethlehem-Pacific electric furnace dust control project will appear exclusively in The Iron Age in an early issue.)*

**Obstacle Course . . .** Pioneering development of the control apparatus, never before attempted on large electric steelmaking furnaces under such stringent regulations, was characterized by political fireworks in the smog-conscious community. Development also had to be hastened to satisfy the control district, which can shut down a non-complying plant. Overcapacity production on the two 75-ton and single 50-ton furnaces had to be maintained to meet hot demand.

The basic problem was to bring moisture content of exhaust gases from below 1 pct to the 7 to 10 pct range to make them electrically active for an electrostatic precipitator. On openhearth furnaces, emission due to combustible fuels being used is in the 7 to 10 pct range. For the type of particulate matter from steel furnaces, the Cotrell electrostatic precipitator is ideally suited and widely used.

A special quickly-removable hooding also had to be developed for fast charging of the furnace with minimum escape of the gases. Expansion of the hooding was an additional problem solved through water cooling. And a powerful suction system with elbow arrangement was also developed to draw gases into the precipitator gridwork before they could escape.

**Non-Patentable . . .** Bethlehem engineers say the final arrangement worked out with the Western Precipitation Co. of Los Angeles is now operating at well over the required 90 pct efficiency. This boils down to keeping the "particulate matter emitted" to under 40 lb per 60,000 lb of charge used per hour.

The project is believed to be non-patentable since it is a correlation of existing devices and methods from several other industries as well as steel.

Mr. Larson said the forthcoming permit for Bethlehem-Pacific "just about cleans up the air pollution problem for the metalworking and production industry in Los Angeles."

**Scores a First . . .** U. S. Steel's Torrance plant, the second largest Los Angeles county mill, won its permit in July, 1951, after spending about $600,000. At the time, it was the first openhearth mill in the country to be completely equipped with smog control equipment.

Fifty miles away at Fontana, Kaiser Steel figures cost of its total air pollution, dust and scrubbing equipment for blast furnaces as well as one openhearth at $4 million. Kaiser is not subject to smog control but continuing research is carried on.

**More Hot Sheets . . .** Firm demand for hot sheets in the Los Angeles area put U. S. Steel's old hand mill there back in business.

SCRAP STEEL loading bucket for Bethlehem Los Angeles electric furnaces has four load cell units under it (top left). Deflections caused by increasing bucket weight are amplified and recorded for instant reading of loadings.

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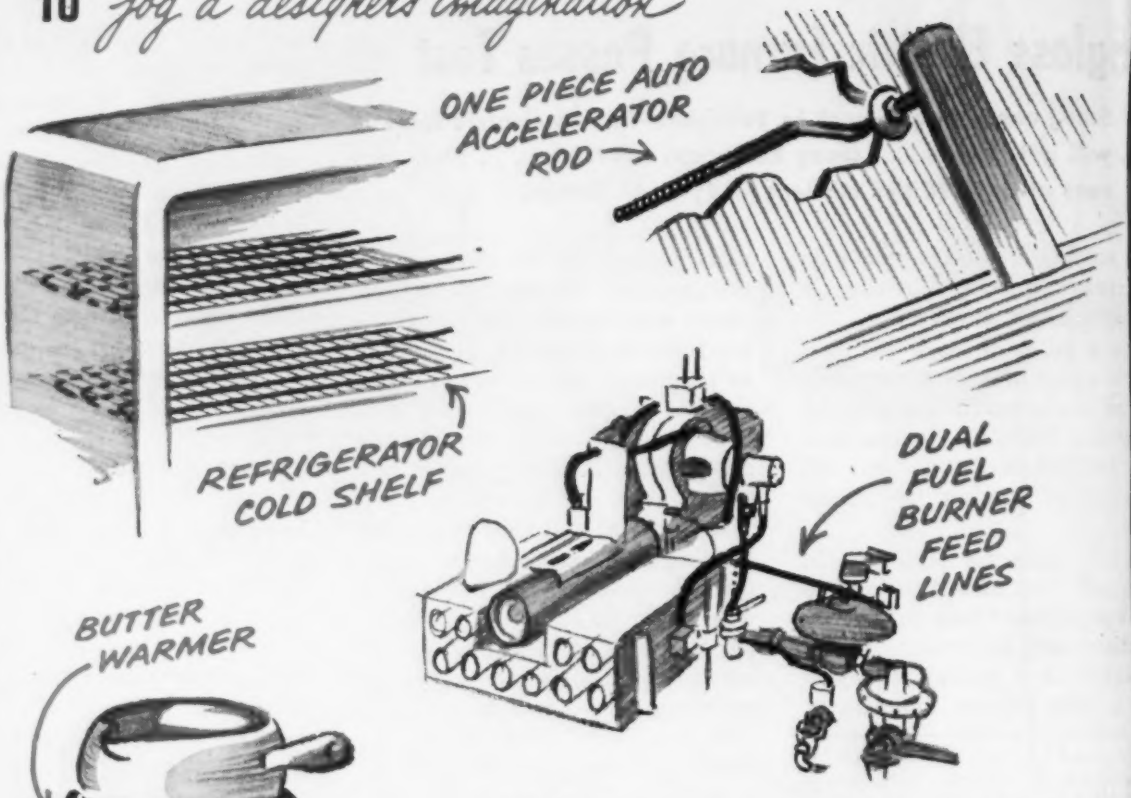
TO *jog a designer's imagination*

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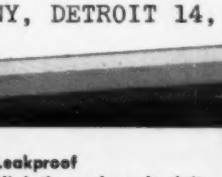


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# GM Fire Kites Tool Order Index

**Livonia disaster believed to have raised tool order index about 15 points . . . Shipments climb too . . . Industry expects firm market in fourth quarter—By *E. J. Egan, Jr.***

New orders and shipments in the machine tool industry climbed to unseasonably high levels in August because of General Motors' Livonia fire. The National Machine Tool Builders' Assn. index showed orders for August were up to 287.9 from 247.3 in July.

Shipments also followed the trend, as GM flew machines into Detroit to get back into production as quickly as possible. A gain of just over 34 points was registered as the shipment index jumped from 267.6 in July to 301.4 in August.

Builders analyzing the increase believe the unusual demand from Detroit alone boosted the index 12 to 15 points. They estimate that the August index would have been around April or June levels if the disaster hadn't taken place. Most builders don't expect further sales repercussions from the fire.

**Builders Are Wary . . .** Bearish fourth quarter predictions emanating from many segments of industry have left many machine tool builders wary. Defense procurement is practically at a standstill and this situation won't change until Office of Defense Mobilization comes up with long range plans for stockpiling.

Majority of people in the machine tool industry aren't worried about what the Pentagon will do. They have generally accepted ODM chief Arthur Fleming's assurances that leasing and disposal of government tools will be negligible.

Method of disposal is one sensitive area as far as builders are concerned. Most are hoping war assets approach won't be used. They would much rather see disposable tools auctioned off.

**How Many Tools? . . .** Size of the house cleaning job facing the Pentagon is also a subject for conjecture. Some estimates place Uncle Sam's tool inventory at 500,000 units. Informed sources in the machine tool industry think the figure is close to 300,000. About 30,000 of these units are believed to be obsolete.

Once a broad based program for mobilization does take shape it should have a definite effect on fourth quarter business in the industry. No one expects sales to climb to Korean levels, but defense buying should come back at lower levels.

Builders who haven't been frightened off by bearish talk still believe they can recruit new business from metalworkers who are modernizing. The industry generally is doing everything permissible to sell the idea to cost-conscious manufacturers thinking of recession.

**Promote Diemaking . . .** To encourage young men to become tool and diemakers, the National Tool & Die Manufacturers' Assn. has produced a 22 min color and sound motion picture. Showing mass production manufacture of products such as automobile crankshafts and clothing zippers, the film features the tool and die craftsmanship on which such production is based.

The camera follows an apprentice through a 4-year, 8000-hour course leading to journeyman status. Chapters of the NTDMA will show the picture in leading tool and die centers throughout the country, and prints will be available for loan through the association's national headquarters.

DETROIT transmission fire damaged more than 50 Gisholt No. 12 automatic lathes. They were returned to the manufacturer.

**Stick to Standard . . .** "Nothing really new," is the word from European sources reporting on the third European Machine Tool Exhibition recently concluded at Brussels, Belgium. Certain improvements were noted in the best selling lines of many builders, but there was nothing radically different.

Eye appeal is being stressed in the latest models but not at the cost of quality. Increased use of brightly painted parts and streamlined design has been effectively combined with a trend toward more power and weight per tool.

Major buying interest at the Exhibition appeared to be in drilling equipment, turret lathes, milling machines, cylindrical grinders, and presses up to 600 tons capacity.

Some visitors at the show said they thought European wire forming machinery has an edge on some American types, particularly in nail-making and continuous wire drawing equipment.

Better quality of U. S. machine tools is still marked, but European builders have a price advantage and through close contact with their customers are able to specialize in production of a wide variety of small types of machine tools.

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# REPORT TO MANAGEMENT...

**Riding the tail of the boom**

Do you still begrudge your workers minutes spent away from machines as you ride the tail of the boom, exerting your productive plant to capture its just share of demand? But the boom is wearying, must relax into a moderate downtrend of business next year which will force you to trim your work-force and work-week.

**Employment will edge down**

Such was the stimulus of the boom that employment reared up to a peak 63 million plus while unemployment ebbed to a remarkable 1.3 million. But now as the boom dissipates some of its vigor, the shears must be turned not only to output but to payrolls. Mildly negative economic factors will militate against record nonfarm employment which reached 49.4 in August. With durable goods industries pointing the trend, employment will begin to ease off gently through 1954, perhaps slipping to a more normal neighborhood of 61 million.

**Overtime vulnerable to first cuts**

Management made cost-conscious by peppier competition within a contracting market will clip overtime first before cutting adrift chunks of its labor force. With the industrial work week now averaging a notch over 40 hours, overtime payments for manufacturing workers stand at about 7¢ per hour. Less overtime, paid at time-and-a-half, slightly leaner payrolls indicate a reduction of consumer purchasing power. With the personal income rate running at $288 billion per year, a light pruning will not grievously impair the spending rate. In prosperous 1951 the personal income rate was but $254 billion and in 1947 a pallid $191 billion.

**Which statistic is more sensitive?**

Initially, employment will not dip in direct relation to the drop in output since employers will first trim overtime. But because of this tendency to delay layoffs, employment statistics next year will not be so sensitive a barometer of production as overtime. The work-week may show the first down wriggle prior to an output change. But in the long term, employment will do most of the fluctuation.

**Consolation will be more efficiency**

Consolation for industries forced to prune payrolls will be efficiency benefits accruing from shedding of marginal labor hired of necessity in the boom. Also, plants humming along comfortably at below peak operations tend to be more efficient producers than when straining at optimum. In view of tighter times, fewer job opportunities, worker psychology will change to an attitude of producing more swiftly and efficiently.

**Call to arms for unions**

Declining employment will for labor leaders be a call to arms. They will be reluctant to recognize that saturation employment cannot endure forever at record. First will come the time-tested tactic of calling for more defense contracts. There will also arise a union hullabaloo for Washington to activate anti-recession measures, principally release of public works contracts. Union demands for these employment transfusions will be woefully premature. Incidentally, any employment recession next year will be the gimmick unions use to lambaste the GOP regime.

**What labor will want in 1954**

How the production winds blow will determine union policy in wresting wage or fringe benefit gains from industry. If production falters then rights itself unions will continue harping on the policy of more money directly into the pay envelope. If downturning production foils this maneuver, unions will focus on fringe benefits, probably argue louder but just as insincerely for a guaranteed annual wage. Since cost-of-living indices stabilize or dip when business wanes, unions may seek to desert the principle of hitching wage hikes to inflation.

—*By T. Metaxas*

*When you install*

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you will have fast, safe, dependable materials handling with an extra margin of safety for overloading under peak or emergency operation—the best mechanical and electrical accessory equipment and controls that can be obtained—precise manipulation, minimum maintenance, and maximum efficiency—integrated engineering design and construction of the highest quality. Ask for Catalogs SE-108 and HL-115-R.

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you will get an extra quality, high hook lift, heavy duty type hoist—the only hoist of this type available. It ranges in capacities from one to 15 tons (100 tons in stationary types) and is adapted for I-beam, monorail or tramrail systems—for floor or cab control—single or variable speeds. Other models also include: double hook, base mounted, and lug suspension hoists. Ask for Bulletin H-113.

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One tool steel company has solved the problem with the aid of LINDE SERVICE. LINDE engineers designed an oxygen and natural gas system that has given the mill an increase in steel ingot yield of up to 10% over former methods. There are further savings, too, because operating costs are far less than for previous methods tried.

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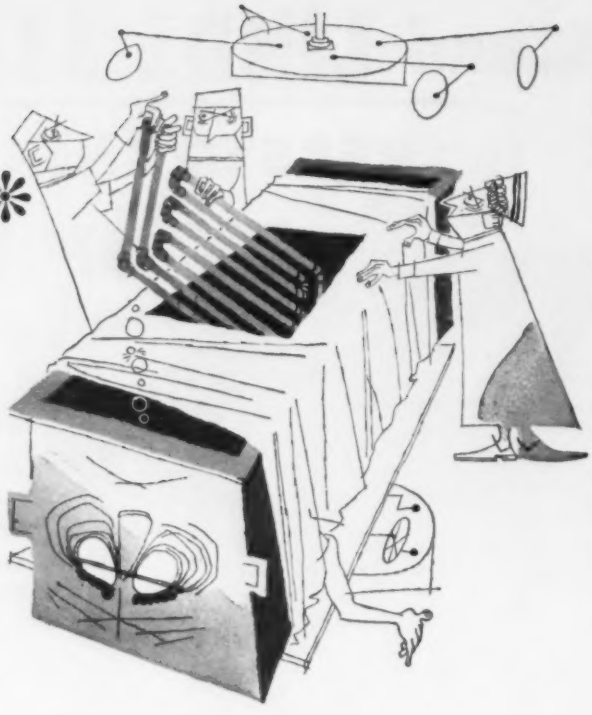

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It costs less to cure coil-itis with Platecoils than to suffer its evils.

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## —Free Publications—

*Continued*

### Finishing chart

Third in a series of wall charts covering fabricating and finishing of stainless steel has been issued by Armco Steel Corp. The newest chart pictures and describes the principal steps in weld-bead finishing and includes a series of photographs on how to get the best results in surface finishing. Also included is a handy table listing the sequence of operations and recommendations for wheel speeds, abrasives and lubricants for grinding and polishing stainless steels. *Armco Steel Corp.*

**For free copy circle No. 12 on postcard, p. 63.**

### Tell your story

You can make your own sound-slide film presentations for less than $20, according to a booklet issued by Minnesota Mining & Mfg. Co. This how-to-do-it publication explains how tape recordings and color slides can be combined to tell a story in an interesting, effective manner at low cost. *Minnesota Mining & Mfg. Co.*

**For free copy circle No. 13 on postcard, p. 63.**

### Shapers

Leading features of the Wotan 22 shaper are outlined in a new brochure. Among the advantages claimed are: simplified, centralized speed change, with direct reading of speeds; 8 ram speeds from 12 to 132 strokes per minute; automatic pressure lubrication to all moving parts inside the column. *Parker Machine Co.*

**For free copy circle No. 14 on postcard, p. 63.**

### Heating

Recent bulletin issued by Dravo Corp. explains how a "heat curtain" was designed to solve the problem of cold air inrushing through open doors. The booklet also explains how two combination oil and gas-fired space heaters were equipped with ductwork to heat 23,400 sq ft of a metalworking plant. *Dravo Corp.*

**For free copy circle No. 15 on postcard, p. 63.**

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## the new *Totally-Enclosed Dual-Cooled* motor

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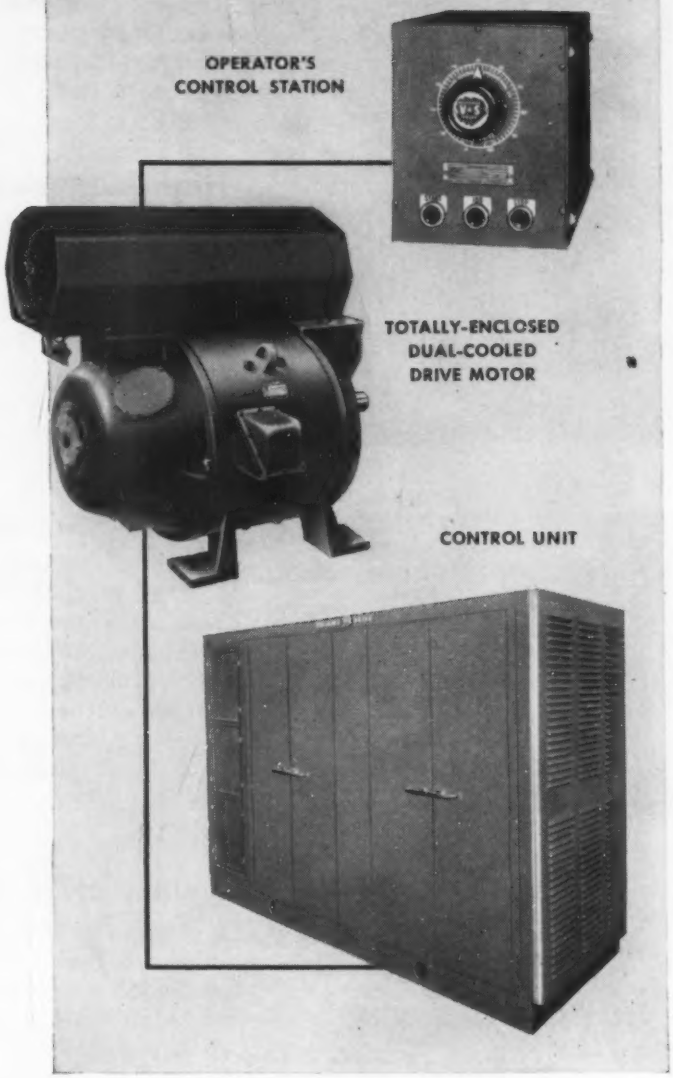


For continuous operation over extremely wide speed ranges . . . or wherever unusually severe operating conditions must be met . . . the new Reliance Totally-Enclosed Dual-Cooled Motor extends the application range of the V★S Drive. Wherever high ambient temperatures, intermittent operation, prolonged low-speed operation, or severe duty cycles pose difficult cooling problems, Reliance V★S Drive with Dual-Cooled Motors have proved to be the best answer. The new Dual-Cooled Motor is available either totally-enclosed or explosion-proof, conforming to Bureau of Mines and Underwriters' specifications, in ratings from 15 through 150 hp. D-1464-B

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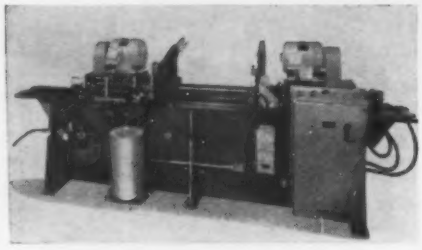

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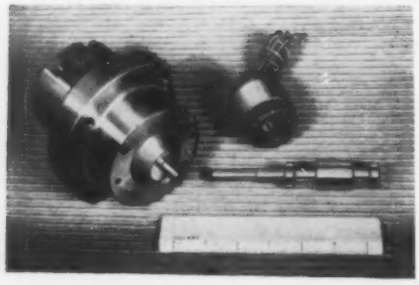
**For more data circle No. 16 on postcard, p. 69.**



## High-frequency motors turn at 100,000 rpm

High-frequency motors for experimental and production use have been developed for driving small grinding wheels at 6000 sfm. To do this, the motors were designed to rotate at speeds up to 100,000 rpm. The motors meet the needs of speeds above the practical range of about 35,000 rpm for belt-driven spindles. The motors are simple and compact. The rotor is mounted directly on the spindle and is the only moving part. The motor is totally enclosed, remaining clean indefinitely. *Bryant Chucking Grinder Co.*

**For more data circle No. 17 on postcard, p. 69.**

## Self-locking chuck holds cutters firmly

Capable of holding cutters from 2 to 6 in. in diameter, the Dedlock chuck eliminates the use of four different adaptors and the time required for changing them. Cutter changes can be made more quickly and easily from ground level. It holds the cutter rigidly and insures that it will run perfectly true with evenly distributed tooth load. For machines having a taper smaller than a No. 4 Morse, a damping device is fitted to eliminate vibration and add rigidity to the adaptor. The device screws from the body of the chuck against the spindle nose. *Clarkson, Inc.*

**For more data circle No. 18 on postcard, p. 69.**

## Twin-station welder is fully automatic

A new design approach to contour welding is incorporated in a high-production capacitor can welding machine. It has a twin-station set-up so that one station can be used for welding while the other is being loaded and unloaded. Independent speed regulation at the corners insures continuous constant velocity welding over the entire butt seam of the capacitor can. Complete automatic control of the welding cycle is included. The carriage traverses rapidly from one end of the seam to the other. Special fluid and electrical rotary valves allow continuous rotation of the welding torch and power ejection of the welded part. High clamping pressure insures good contact between the material and copper backup. *Morton Mfg. Co.*

**For more data circle No. 19 on postcard, p. 69.**

*Turn Page*

# Why "breathing space" between each wire?

- To provide maximum flexibility—tiny, precise amounts of "breathing space" are engineered between each of these wires.
- There are 295 wires in this particular construction . . . 9 different sizes of wire.
- All wires are drawn in Macwhyte's plant to assure uniform quality.
- Heavy, tenacious lubricants fill the spaces between wires. This *Internal Lubrication* guards against corrosion and friction, and also increases flexibility.
- Macwhyte's PREforming process forms the wires and strands into a spiral so they lie naturally in place with a minimum of internal stress.
- From a thousand and one wire ropes, Macwhyte engineers are ready to recommend the right rope for your particular needs. For best, lowest cost wire rope service, write today for recommendations of the best constructions of rope to use on all your equipment.

*This Macwhyte Rope is 6 x 41 Filler Wire PREformed Lang Lay Monarch Whyte Strand with IWRC, just one of the thousand and one wire ropes made by Macwhyte.*

# MACWHYTE WIRE ROPE

***THE RIGHT ROPE FOR YOUR EQUIPMENT***

**Ask for G-15 Wire Rope Handbook**

**Macwhyte Company,** *2911 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago • St. Paul • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.*

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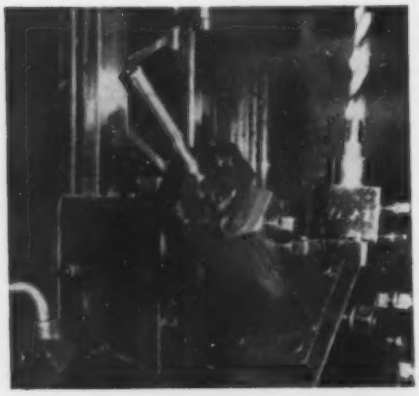
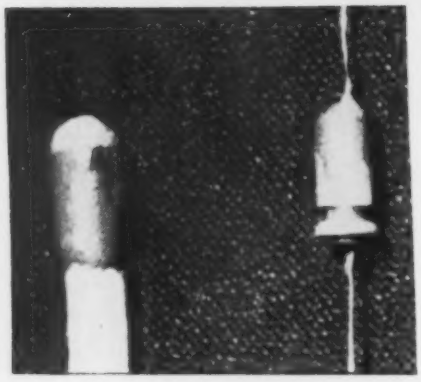


## Tool holders have wide holding range

Added to an existing line of tool holders is a KA model with either a 1-in. or 1½-in. shank and capable of holding any shaped tool or tool bit with a diameter of ⅛ to 1 in. In reality, it is a miniature axially-true floating vise. It is only necessary to insert a tool shank in the V-jaw section of the holder and tighten the jaw screws. Dead center adjustment is secured by floating the clamped tool into position and tightening the body screws. Precision grinding of all working surfaces insures that the tool holder's shank and V-jaw section are permanently parallel within 0.0005 to 0.0006 in. Runout is less than 0.0001 in. per in., making tool alignment automatic. No fussing is required to obtain perfect alignment consistently on the first attempt. *Brookfield, Inc.*

**For more data circle No. 20 on postcard, p. 69.**



## Tiny tantalum capacitor believed smallest

A tiny tantalum capacitor, believed to be the smallest high capacity unit designed for low voltage direct current makes possible further size reductions in small assemblies using transistors It is intended as a companion to the transistor. The new unit is only 5/16 in. long and ⅛ in. in diameter so that it can be used in hearing aids. It can also be used in transistorized military equipment and for potential miniature electronic products. Major feature is its size per volt microfarad. Long shelf and operating life, wide temperature range and low leakage current are other features. It is sealed against leakage or contamination and uses a nonacid electrolyte; operates over a temperature range of −20° to 50°C. *General Electric Co.*

**For more data circle No. 21 on postcard, p. 69.**

## Milling cutter uses only two blade sizes

A new stagger tooth method of mounting replaceable blades allows making any width milling cutter desired. "A" size blades are for cutters from ½ in. to ¾ in. wide. Cutters more than ¾ in. wide are made up using "B" size blades. Use of only two blade sizes for a complete line of cutters simplifies stocking problems for customers and allows quick, easy replacement from stock. The stagger tooth method of mounting avoids the use of expensive long lengths of carbide and the inherent brazing strains. Tooth breakage is less and broken teeth cost less to replace. Besides stagger tooth slotting applications, it can be used for heavy side milling where increased cutter width is desired. These milling cutters have diameters ranging from 4 to 14 in. *Millit, Inc.*

**For more data circle No. 22 on postcard, p. 69.**

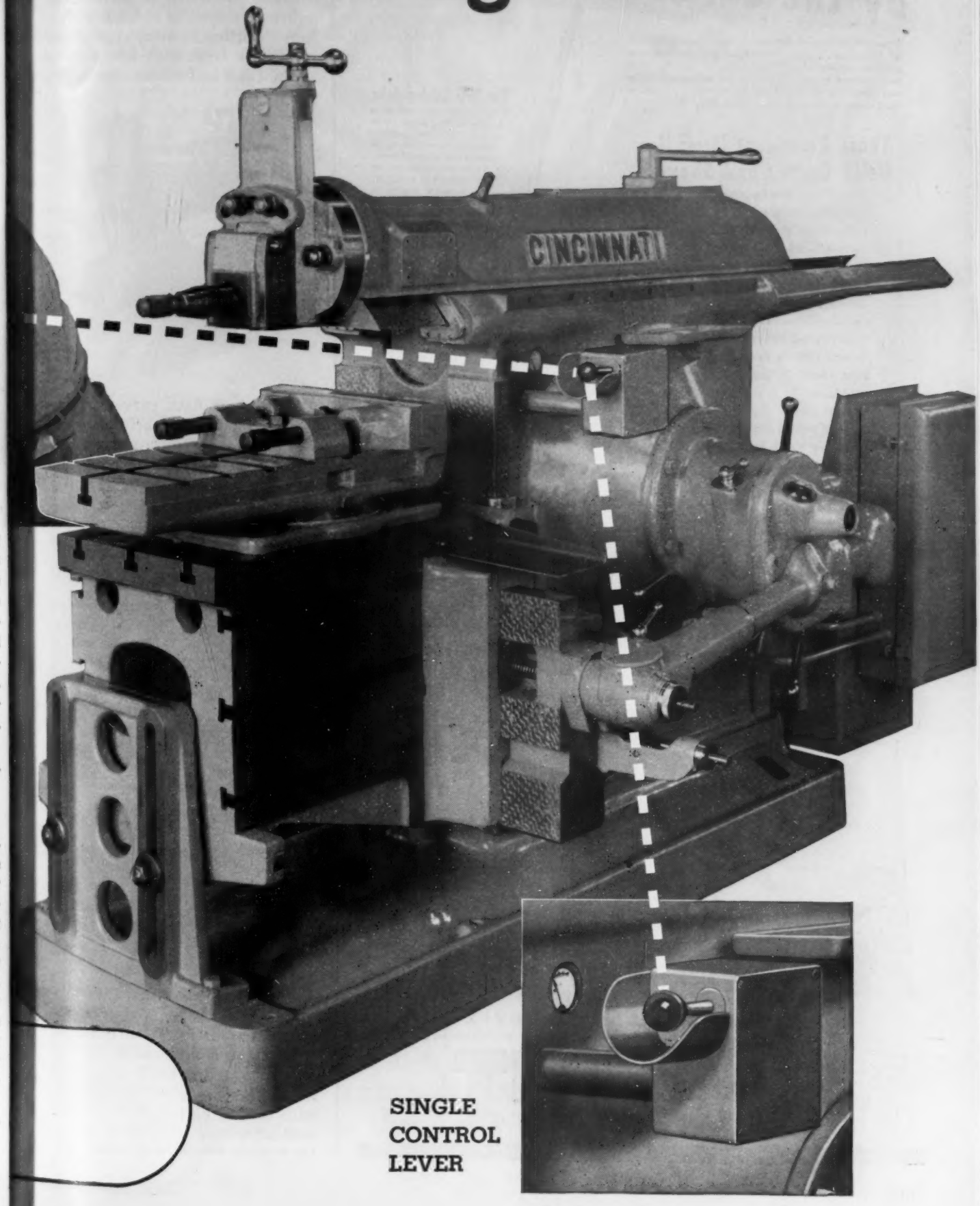
## Comparator gives accuracy and versatility

Many advantages are offered in a lightweight mechanical comparator, called the Producto-Chek. It features high accuracy and wide versatility at low cost, making it economically feasible to use for assembly line checking. Size settings are made rapidly because of three adjustments. A lead screw on the column provides the coarse adjustment and facilitates rapid rough positioning of the gaging head. One of the two fine adjustments is a thumb screw type which moves the gaging head slightly up or down. The other is a lever for moving the dial scale from left to right for minute zeroing movements or for setting the scale off zero to compensate for known errors in masters. The gaging head features an amplifying principle, a double reed system, which obviates the use of gear trains, levers, racks or pinions with lag, backlash and wear usually found in such systems. It also makes the instrument self-compensating to temperature to maintain linearity of calibration over a wide temperature range. *DoALL Co.*

**For more data circle No. 23 on postcard, p. 69.**

*Turn to Page 80*

# ...Outstanding ACCURACY

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# You Can Judge a Machine by the Calibre of its Users!

In every section of the country...in every branch of industry . . . you will find satisfied owners and operators of UNIT equipment. Surely, such widespread popularity must be deserved. Why not investigate? Write for novel "TV" brochure that depicts the complete Unit line.

## These Prominent Firms Use UNIT Cranes and Shovels

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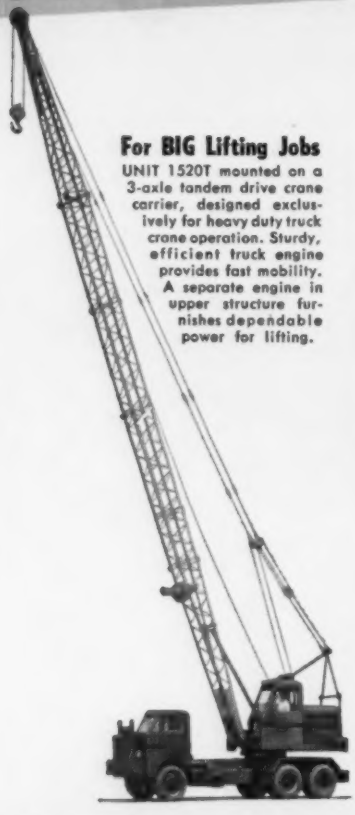
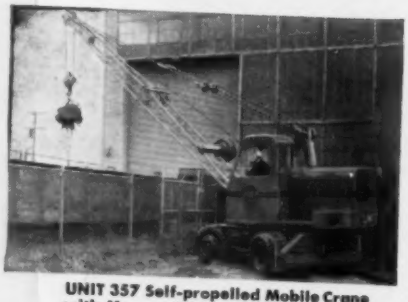
Chrysler Corporation
Consolidated Vultee Aircraft
Diamond Match Company
Dow Chemical Company
Frigidaire
General Electric Company
General Motors (Pontiac Div.)
Goodyear Tire & Rubber Co.
Great Lakes Steel Corp.
International Harvester
Niagara-Mohawk Power & Light
North Carolina Pulp & Paper
Northern Natural Gas Co.
Oliver J. Olsen Shipbuilding
Packard Motor Car Company
Pennsylvania Railroad
Pittsburgh Plate Glass Co.
R. J. Reynolds Tobacco Co.
Sacony Vacuum Oil Company
Shell Oil Company
A. O. Smith Corporation
Universal Pictures, Inc.
Weyerhauser Timber Co.



**For BIG Lifting Jobs**
UNIT 1520T mounted on a 3-axle tandem drive crane carrier, designed exclusively for heavy duty truck crane operation. Sturdy, efficient truck engine provides fast mobility. A separate engine in upper structure furnishes dependable power for lifting.



UNIT 357 Self-propelled Mobile Crane with Magnet Lifting Scrap Iron.

Available in Crawler and Mobile Models . . . ½ and ¾ Yard Excavators . . . Cranes up to 20 tons lifting capacities . . . Fully Convertible to all attachments.

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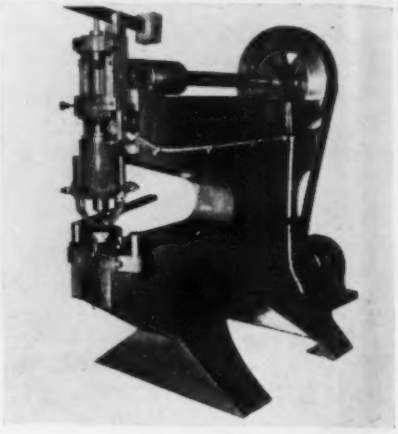
SHOVELS • DRAGLINES • CLAMSHELLS • CRANES • TRENCHOES • MAGNETS




## Nibblers

Practically all alloys can be cut without distortion in turret head nibblers, according to the manufacturer. Cutting accuracy applies even to shapes from high alloys up to ½-in. thick and milder alloys up to



1-in. thick in flats, curves, irregulars or tubing. Primarily designed to nibble, it will also shear where reasonable distortion is no factor. It cuts metal shapes quickly, is easy to operate and has long tool life. *Tabor Manufacturing Co.*

**For more data circle No. 24 on postcard, p. 69.**

## Large compressor

Designed to deliver 600 cfm of air at 100 psi, a new and larger unit has been added to an industrial line of compressors. It is powered by a 150 hp induction motor and has 43 pct greater capacity but requires very little more floor space. The

unit is vibrationless and can be installed without the need of an expensive foundation. It can be moved, if necessary, from one location to another on a fork truck. It is available with running cooling water, or with cooling unit built in with or without a hood. *Schramm, Inc.*

**For more data circle No. 25 on postcard, p. 69.**

## Rust inhibitor

Non-metallic rust inhibitor is developed as an oil additive. Identified as Atpet 100, the inhibitor is a sorbitan mono fatty acid ester akin to Span 80 which is used in many military specifications. It is shipped as a concentrate for addition by the refiner or compounder to his oil. Uses include the protection of stored aircraft engines, diesel and gasoline engines, turbines, pipe lines and ferrous tools. *Atlas Powder Co.*

For more data circle No. 26 on postcard, p. 69.

## Jet starting unit

A source of constant-current, variable-voltage electric power is supplied for jet engine starting and testing by a newly developed motor-generator set. Rated at 500 amp, 28.5 v dc, continuously, the set can

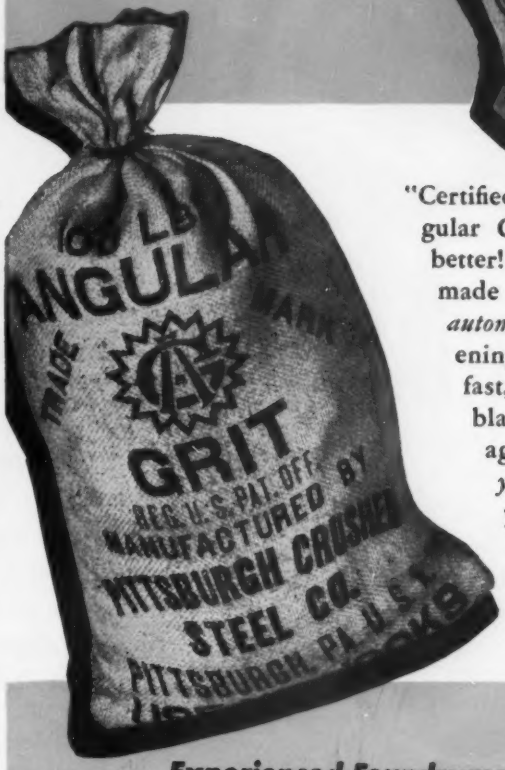
supply 700 amp for 3 min, or 1000 amp for 1 min in intermittent duty. It provides variable voltage to produce constant current of 500 to 1000 amp over a range of 10 to 28.5 v dc. Voltage regulation is ±2½ pct and current regulation ±10 pct. The generator is a compound wound type with interpoles and inbuilt excitation. On a common shaft is a 25 hp, 220-440 v. three-phase, 60-cycle squirrel cage induction motor which operates at 1750 rpm. Protective controls are provided for both the aircraft and the set. Other features are included for ease of operation and maintenance. *Motor Generator Corp.*

For more data circle No. 27 on postcard, p. 69.

*Turn to Page 84*


# CERTIFIED ABRASIVES

CLEAN and CLEAN and CLEAN and CLEAN!




"Certified" Samson Shot and Angular Grit wear longer, clean better! That's because they're made *extra-tough* by a special *automatically controlled* hardening process that assures you fast, efficient, high-quality blast cleaning over and over again. Try "Certified" in *your* cleaning room and you will discover why it is the *first choice* in hundreds of foundries.

***All sizes graded to SAE specifications.***

**Experienced Foundrymen say:**

*"Always specify Certified"*

ACCEPTED AND USED FOR OVER 55 YEARS

**PITTSBURGH CRUSHED STEEL CO.**
Pittsburgh, Pa.

FEMA

**STEEL SHOT AND GRIT CO.**
Boston, Mass.

# THE AMERICAN STORY

## CHAPTER 13

## *Here there's no patience with "Bad Luck"*

Inspection of screws can only be done one way... *the hard way.* And this means close and constant checking for depth and fit of recess . . . for concentricity and appearance of head . . . and for clean and full-formed threads.

For this work, we train the most intelligent eyes we can find. *And we train them not to blink*... not to overlook even the slightest touch of "bad luck" in variation from the letter of the law of American inspection procedures. That's why you get a higher perfection-percentage in every shipment of American Phillips Screws. Write:

**AMERICAN SCREW COMPANY**

*PHILLIPS HEADquarters*

*WILLIMANTIC, CONNECTICUT*

Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
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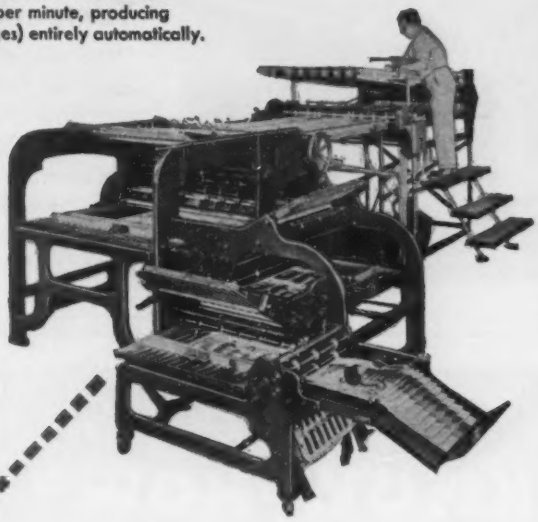
# The FIRST MODEL

**A MULTI-FOLDING MACHINE,** built by SEMCO to operate at the rate of 450 lineal feet per minute, producing 16 folds (32 pages) entirely automatically.

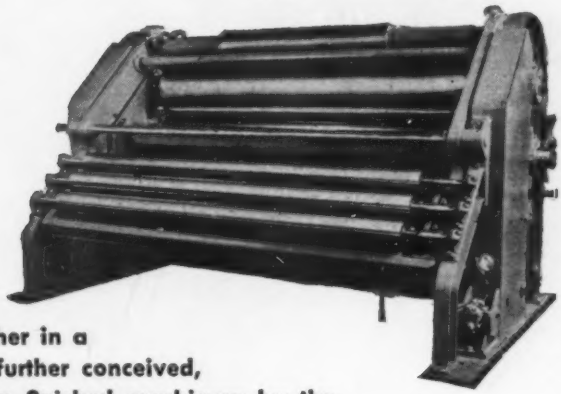


**A RAMIE DECORTICATING MACHINE** built by SEMCO, showing a "business end" view of the mobile unit that produces raw fibre from the fibrous RAMIE plant used for weaving into textile. Pictures of this machine in operation are considered of historical interest and are displayed in the Smithsonian Institute, Washington, D. C.

## of industry's high production machinery

## is often BUILT BY SEMCO

**A SPECIAL PAPER COATING MACHINE** built by SEMCO to a customer's specifications. Note the long rolls, ground for "kiss" contact throughout their entire length.



**NEW MODELS — NEW IDEAS,** whether in a visionary or concise state can be further conceived, designed, developed and built into finished machinery by the SEMCO organization. THIS IS A DIFFICULT FIELD, but the SEMCO organization has specialized in it for thirty-four years and thereby has become most proficient.

*Write today for the SEMCO brochure "Ready to serve you".*

**SEMCO**

**SERVICE MACHINE CO. INC.**

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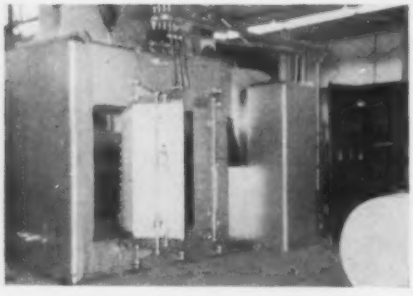


## Tempering-flattening furnace is self-contained

This tempering and flattening furnace has three sections of pressure plates or dies, and three doors, one for each section. The valves for the opening and closing of the dies are above the center door, and the cylinders are on top behind the flat plates. When the cylinders are raised the dies open to provide ten openings for insertion of the flat pieces that are to be flattened and tempered. The control panel with all electrical switches is at the right and the hydraulic pumping system is in back of this panel. *Waltz Furnace Co.*

**For more data circle No. 28 on postcard, p. 69.**

## Oil-burner motor

A fractional-horsepower motor for high and low pressure oil burners is small and lighter than previous models. The motor features reversible rotation in ⅛ and 1/6 hp ratings. Rotation can be changed by switching connections in a terminal box on the pulley-end flange face. This feature can cut service stocks to 50 pct. *General Electric Co.*

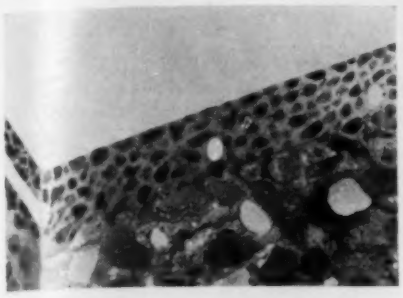
**For more data circle No. 29 on postcard, p. 69.**

## Hose clamps

One-piece hose clamps made from special spring steel to exacting specifications automatically provide uniform tightening action. They insure a perfect seal between the hose and hose connection in spite of hose shrinkage, expansion or contraction due to age or temperature changes. Constant spring tension eliminates manual adjustment or retightening.

Predetermined nonfatiguing spring pressure permits their reuse. Rounded surfaces do not cut into hose material whether it be rubber, plastic or fabric. Because of special finish, they are rust resistant. *Eaton Manufacturing Co.*

**For more data circle No. 30 on postcard, p. 69.**



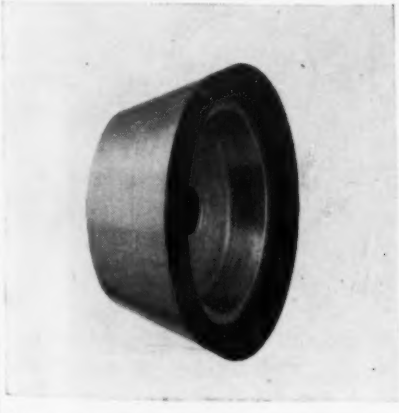
## Safe hydraulic fluid

Known as Houghto-Safe, a nonflammable hydraulic fluid combines maximum fire resistance with good hydraulic efficiency. This fluid is said to be nontoxic and noncorrosive so that it can be used in hydraulic equipment near open flames or adjacent to extreme heat conditions. It is a snuffer-type material rated as acceptable from the fire hazard standpoint by the Associated Mutual Fire Insurance Companies. In hydraulic pump tests, it shows lubricating ability of high-grade petroleum hydraulic oils. It will not freeze and is easily pumpable at working temperatures down to 0°F. *E. F. Houghton & Co.*

For more data circle No. 32 on postcard, p. 69.

## Blue diamond wheel

Designed to run at slower speeds to decrease flicking of precious grit, provide smoother ground surfaces and extend wheel life, a blue diamond wheel offers economies in grinding tungsten carbide or other



hard materials. Wheels are made in 2 and 3-in. diam with arbor holes made to the user's specifications. Although wheel speed is slower, grinding is faster and smoother. *John T. Lloyd.*

For more data circle No. 33 on postcard, p. 69.

*Turn Page*

## Industrial flooring withstands heat to 2000°F

Aluminum rods embedded about 1 in. below the surface of new industrial flooring disperses heat rapidly spreading it over a wide area of the floor. The flooring withstands thermal shock and does not deteriorate under temperatures to 2000°F. High resistance to heat and all wearing forces makes the flooring suited for metal rolling mills, foundries, glass factories. Utilizing the basic Dynapakt Concrete, it consists of the hardest specially-selected and graded rock and sand combined with cements in a low-water ratio. Installed by power-compacting. *Flash-Stone Co., Inc.*

For more data circle No. 31 on postcard, p. 69.

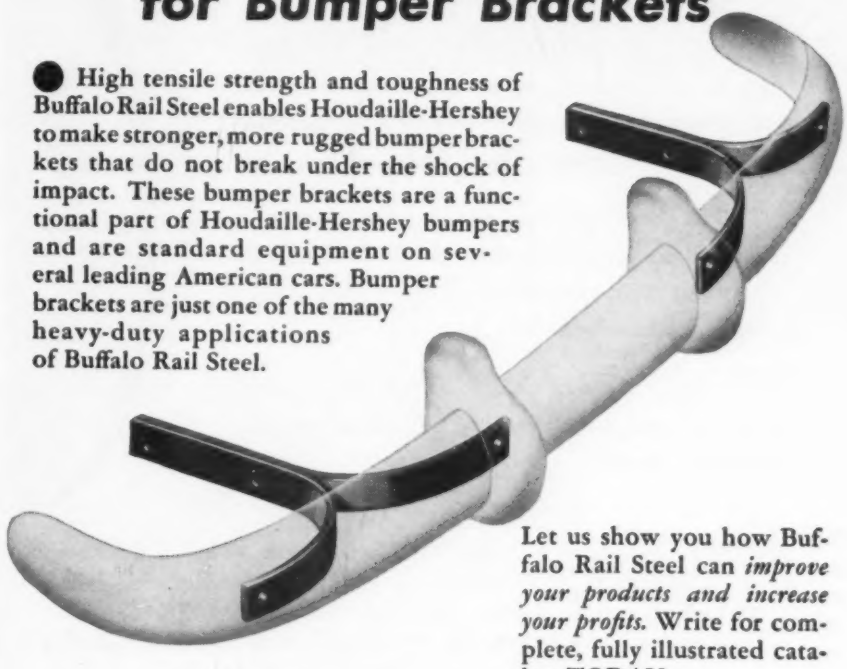

# Houdaille-Hershey*

**uses**

# BUFFALO STEEL

**for Bumper Brackets**

● High tensile strength and toughness of Buffalo Rail Steel enables Houdaille-Hershey to make stronger, more rugged bumper brackets that do not break under the shock of impact. These bumper brackets are a functional part of Houdaille-Hershey bumpers and are standard equipment on several leading American cars. Bumper brackets are just one of the many heavy-duty applications of Buffalo Rail Steel.



Let us show you how Buffalo Rail Steel can *improve your products and increase your profits.* Write for complete, fully illustrated catalog TODAY.

** Houdaille-Hershey is one of America's largest independent manufacturers of Automotive and Aircraft parts.*

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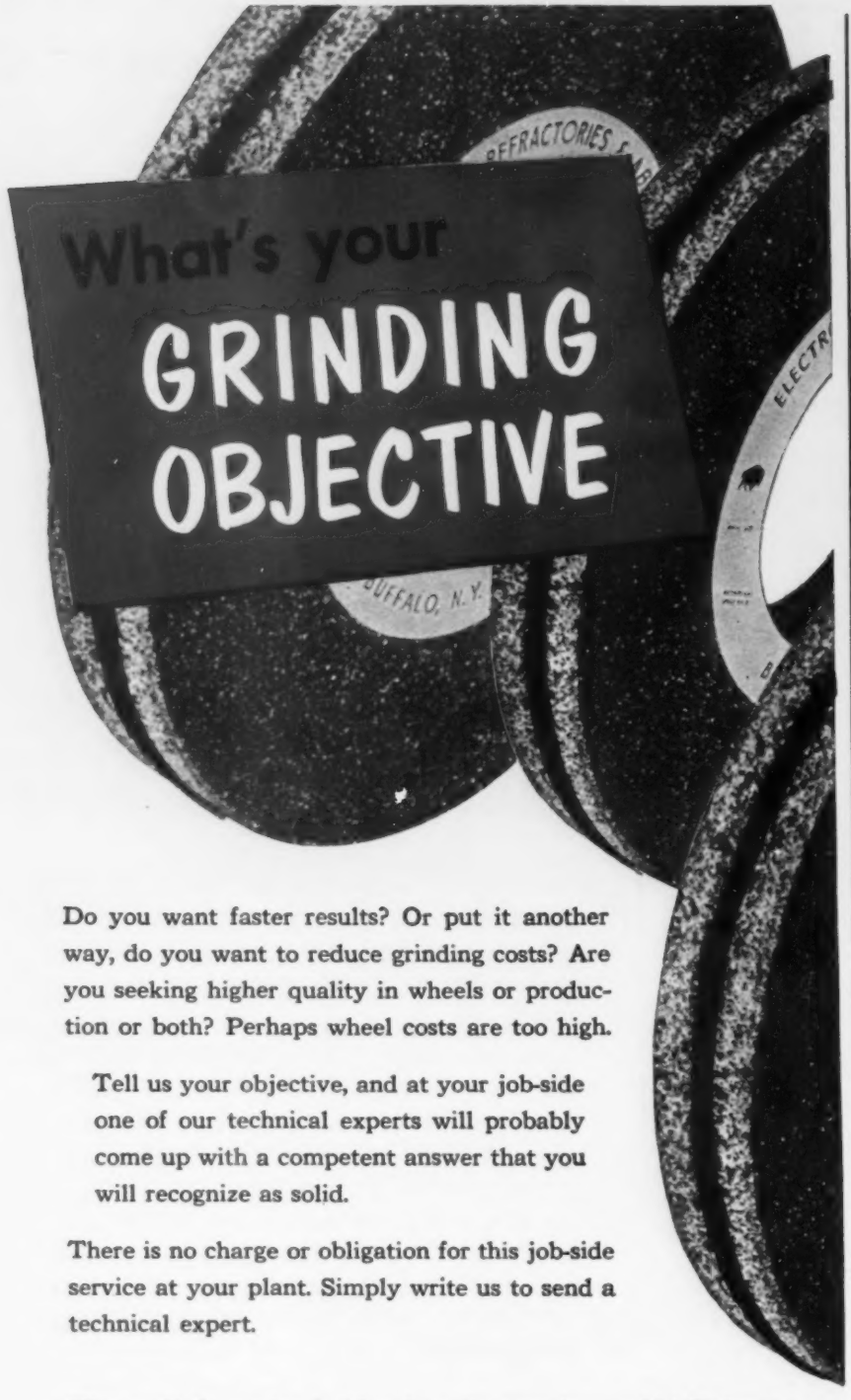


Do you want faster results? Or put it another way, do you want to reduce grinding costs? Are you seeking higher quality in wheels or production or both? Perhaps wheel costs are too high.

Tell us your objective, and at your job-side one of our technical experts will probably come up with a competent answer that you will recognize as solid.

There is no charge or obligation for this job-side service at your plant. Simply write us to send a technical expert.

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Specific Purpose Resin

Electro TRADE-MARK SINCE 1919

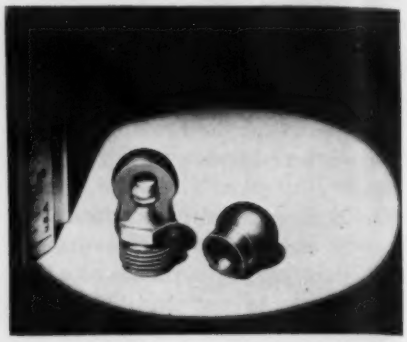
GRINDING WHEELS Vitrified

K-439




## Grease fitting cover

Dirt and other abrasives can be kept from entering grease fittings by use of a cover known as the Zur-Kap. It is made of oil-resistant neoprene and can be used for all equipment with Zerk- or Alemite-



type fittings. Zur-Kaps eliminate danger of excessive wear from dirt particles usually forced into unprotected fittings with each application of grease. They snap on easily and save time in cleaning fittings before each lubrication. *Winner Manufacturing Co.*

**For more data circle No. 34 on postcard, p. 69.**

## Pallet dolly

No swivel casters are used on a universal pallet dolly that rolls and steers on any type floor. It has maneuverability and ease of operation. The load is supported on 24 6-in. wheels which provide surface contact on rough surfaces. The

wheels roll easily under load and can be had with rubber or aluminum-alloy tread to suit operating conditions. Front and rear wheels are on spring-loaded axles to aid guiding the loaded pallet in making 360° turns. The dolly is particularly well adapted for use in refrigerator cars and trucks. Sizes are 30 in. x 40 in. and 40 in. x 48 in. *Roll Rite Corp.*

**For more data circle No. 35 on postcard, p. 69.**

The Iron Age

# SALUTES

## *Milton J. Karp*

**He's the kind of man who expands during a depression. That's why he's head of the firm he founded.**

HOW do you become president of a $5 million metalworking plant? Best way is to form your own company. That's what Milt Karp did. It takes a lot of courage, but Milt's the kind of man who puts up a new plant when economists tell him it's time to cut back.

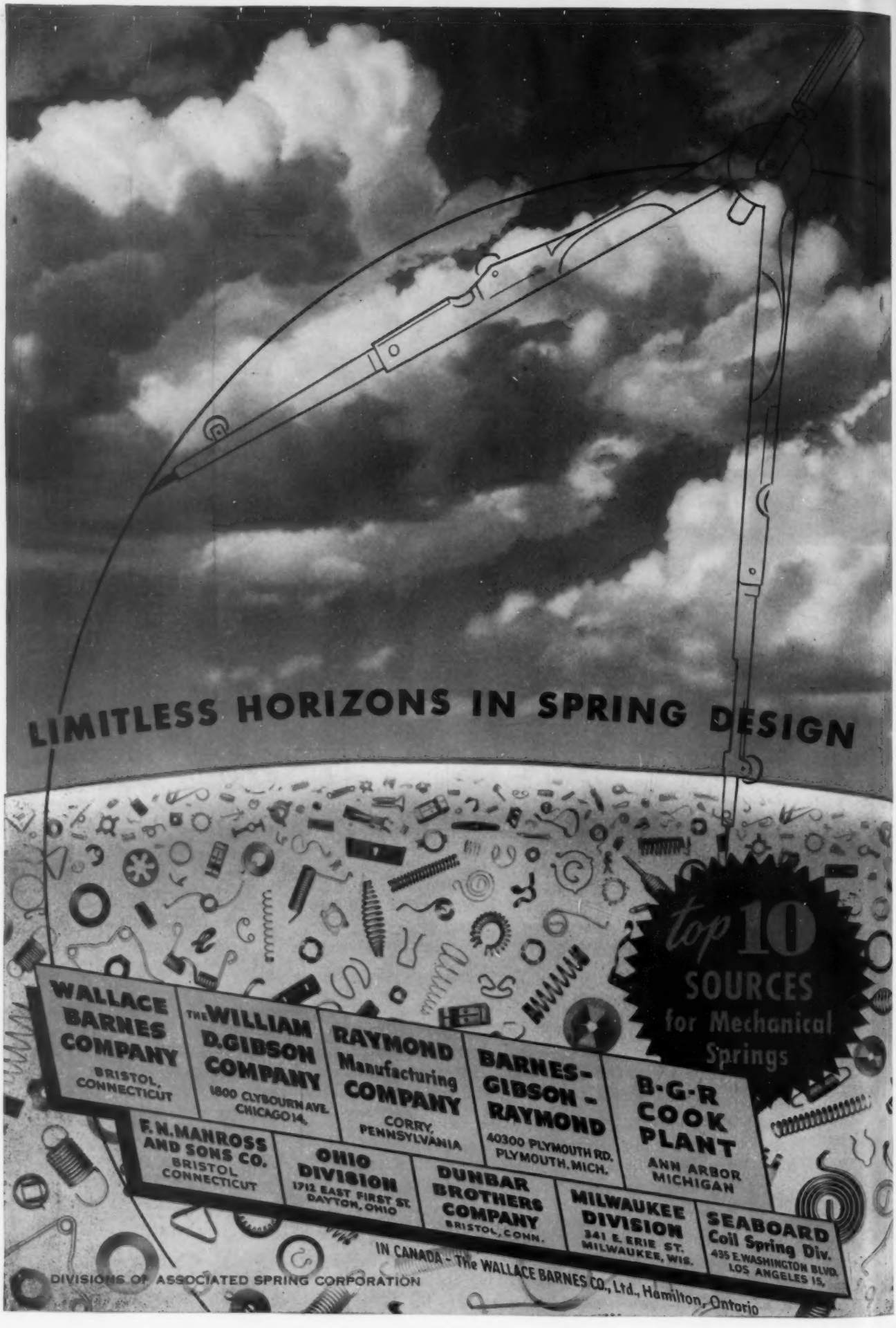
One of the pioneers in the sheet metal enclosure industry, Milt started his business career 40 years ago selling open-faced metal fuze boxes. Fifteen years later, with few other assets than his 15 years experience, Milt established Karp Metal Products Co., Brooklyn, to manufacture industrial junction boxes.

Business was fine until the Depression and labor troubles slugged him. This was the signal for Milt to expand.

From trade magazines, he clipped hundreds of advertisements showing metal-packaged products. Sales letters were mailed to these firms and contracts were closed with one out of every 10 companies solicited. Milt was now in a new and larger business as a sheet metal enclosure manufacturer.

After World War II, when many of his competitors were trying to talk themselves into a recession, Milt floated a $350,000 loan and took a long-term lease on a million dollar plant. Today Karp Metal Products Co. is one of the leading independent manufacturers of custom-built sheet metal chassis, housings, cabinets, racks and enclosures.

Milt's pride in having turned a dinky, three-man shop into a company with sales of more than $5 million per year is justified. Though he sold Karp Metal to H & B American Machine Co. earlier this year, Milt remains where he should be—as president.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top 10 SOURCES for Mechanical Springs
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THE WILLIAM D. GIBSON COMPANY
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RAYMOND Manufacturing COMPANY
CORRY, PENNSYLVANIA
BARNES-GIBSON-RAYMOND
40300 PLYMOUTH RD. PLYMOUTH, MICH.
B-G-R COOK PLANT
ANN ARBOR MICHIGAN
F. N. MANROSS AND SONS CO.
BRISTOL CONNECTICUT
OHIO DIVISION
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# The Iron Age INTRODUCES

**Roy J. Gavin,** elected vice-president, Irvington Varnish & Insulator Div., MINNESOTA MINING & MFG. CO., St. Paul, Minn.

**W. H. McConnell,** elected vice-president—sales, DIAMOND ALKALI CO., Cleveland; and **C. E. Lyon,** works manager, electrochemical plant at Houston, also becomes a vice-president.

**Paul W. Brannon,** appointed vice-president of manufacturing, Pesco Products Div., BORG-WARNER CORP., Bedford, Ohio.

**George White, Jr.,** elected to executive vice-president, VITRO CORP. OF AMERICA, New York.

**Erle M. Constable,** appointed assistant vice-president, THE GLENN L. MARTIN CO.

**Fred J. Schreiber, Jr.,** appointed director of Commercial Research, TOWNSEND CO., New Brighton, Pa.

**L. M. Gary,** appointed director of forge sales, Defense Div., WILLYS MOTORS, INC., Toledo.

**Dr. Newman W. Thibeault,** named assistant director of research and development in charge of Physical Research & Microscopic Sections, NORTON CO., Worcester.

**A. C. Richardson,** named technical director, BATTELLE INSTITUTE, Columbus.

**Albert C. Jones,** promoted to superintendent of the plate and structural mills, Tennessee Coal & Iron Div., U. S. STEEL CORP.; and **C. J. Porter,** made superintendent of ovens and unloading stations at the by-product Coke Dept.

**Joseph N. Kuzmick,** appointed coordinator, Corporation Research & Development, RAYBESTOS - MANHATTAN, INC.

**M. R. Wingard,** appointed sales engineer, Chemical Plants Div., BLAW-KNOX CO., Pittsburgh.

**Victor F. Tripoli,** has joined the Mechanism and Dynamics Department staff, Armour Research Foundation, ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago.

**Elmer G. Naftzger,** appointed sales engineer, McINNES STEEL CO., Cleveland.

**Arthur E. LeGare,** appointed sales engineer, ORTON CRANE & SHOVEL CO., Chicago.

**L. E. Blackwell, Jr.,** appointed sales application engineer, RELIANCE ELECTRIC & ENGINEERING CO., Charlotte, N. C. sales office.

**Thomas H. Sheehan,** promoted to manager of manufacturing, HOUDAILLE-HERSHEY CORP.

**George P. Wilson, Jr.,** named manager, Finance Dept., Engineering & Construction Div., KOPPERS CO., INC., Pittsburgh; and **Herbert A. Semler,** becomes manager of the Control Section for the entire Engineering & Construction Div.

**C. W. Heppenstall,** named plant manager, rod, bar and wire works at Newark, Ohio, KAISER ALUMINUM & CHEMICAL CORP.

**Robert L. Stockus,** becomes assistant manager, Rolling Mill Div., FARREL-BIRMINGHAM CO., INC., Ansonia, Conn.

**Joseph E. Lindsay,** becomes assistant manager of the Engineering Service Dept., THE NATIONAL RADIATOR CO., Johnstown, Pa.

**Tom L. Murray,** appointed assistant sales manager, LEVINSON STEEL CO.; and **Sidney Moidel,** named office manager.

MILTON F. LEPPER, appointed executive vice-president, Max Solomon Co., Pittsburgh.

ROGER O. BAY, elected a vice-president, Bonney Forge & Tool Works, Allentown, Pa.

PAUL VAN WAGNER, promoted to vice-president, Copperweld Steel Co., Pittsburgh.

## Personnel

**E. J. Conlan**, appointed district manager, Southern sales district, KENNAMETAL INC.

**W. Miller Koenig**, appointed eastern district sales manager, New York headquarters, ROTARY ELECTRIC STEEL CO.; and **D. J. Connelly**, appointed Cleveland district sales manager.

**Warren B. Dierking**, appointed assistant sales manager, Packaging Div., THE DOBECKMUN CO., Cleveland.

**C. S. Purnell**, named regional electric utility manager, WESTINGHOUSE CORP., Pittsburgh, **K. L. Horgan**, appointed industrial manager; and **J. C. Frink**, will head marine and aviation dept., Northeastern region.

**Elmer H. Wegner**, appointed general manager of manufacturing, CLEAVER-BROOKS CO., Milwaukee.

**Chauncey K. Hubbard**, named assistant to the general manager, Container Div., JONES & LAUGHLIN STEEL CORP., Pittsburgh.

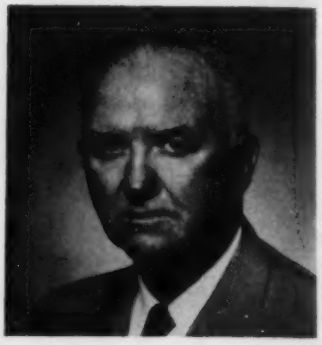
**John R. Woodruff**, appointed Pacific Coast District manager, ELECTRIC CONTROLLER & MFG. CO., Cleveland; and **Claude A. Mitchell, Jr.**, becomes district manager, Houston.

**Dr. Louis T. Rader**, appointed general manager, newly established Specialty Control Dept., GENERAL ELECTRIC CO., Schenectady Works; **K. N. Bush**, named manager of manufacturing, **H. L. Palmer**, becomes manager of engineering; **J. P. Rutherford**, named manager of marketing; and **C. S. Van Wormer**, named manager of finance.

**M. L. Ruggieri**, appointed general manager, of production, Birmingham plant, JOSLYN MFG. & SUPPLY CO., Chicago.

**William R. Frey**, appointed Denver representative, PROTECTIVE COATINGS, INC., Tampa, Fla.

**Glenn C. Wilhide**, named division manager, Wayne, Mich., GAR WOOD INDUSTRIES, INC.



H. E. DRALLE, recently named manager, New York District, Westinghouse Electric Corp.

JOHN W. PENNINGTON, named manager, Technical Dept., Metal Products Div., Koppers Co., Inc.

CARL F. JENSEN, appointed plant manager, Des Plaines Stamping Plant, Shakeproof Div., Tool Works, Chicago.

KENNETH VAN KAMPEN, named general superintendent, Warner Electric Brake & Clutch Co., Beloit, Wis.

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Producers of fine tool steels—High Speed Steels
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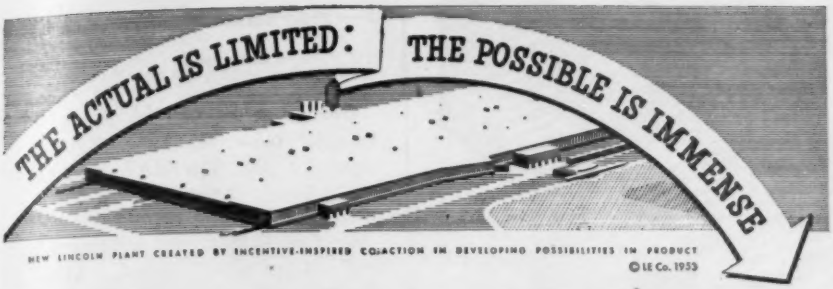
THE ACTUAL IS LIMITED: THE POSSIBLE IS IMMENSE
NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED COACTION IN DEVELOPING POSSIBILITIES IN PRODUCT
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TODAY'S MOST ADVANCED AC WELDER. "Fleetwelder", available in 300, 400, and 500 amp sizes, gives you

# 11 WAYS to cut AC welding costs

DESIGNED for faster, simpler, more efficient welding, Lincoln's "Fleetwelder" saves money on every AC job. Here's how:

**1. SELLS FOR LESS**—Built with Lincoln incentive production methods, "Fleetwelders" low selling price gives *more range, longer service, easier, faster operation, greater dependability* for the dollar . . . to cut your AC welding costs.

**2. Complete Overload Protection**—Built with *generous* reserve capacity for long sustained output at high currents, "Fleetwelder" is *completely protected* against damage due to overheating *by a thermostatic controlled magnetic starter* . . . a feature exclusive with Lincoln.

**3. Exclusive "Arc-Booster"**—Pioneered by Lincoln, the exclusive "Arc-Booster" blasts the end of the electrode with extra amps for an instant when the electrode touches the work to start the arc automatically. Ideal in out-of-position welding.

**4. Completely Safe**—No high frequency devices as on some welders to help arc starting. Open circuit voltage is only 71 volts. Output terminal panel recessed to eliminate accidental shorting of leads.

**5. "Low Voltage" Safety Relays** available for special work. (Optional extra.)

**6. Takes Less Power**—"Fleetwelder" draws less amps in idle current than required for other AC welders. Inbuilt power factor is higher. Has pilot light to indicate power is on.

**7. Low Maintenance**—Ventilated from the top, "Fleetwelder" operates cleaner . . . needs less attention. Coils are permanently anchored, cannot become loosened to wear the insulation and short out. Easy accessibility to all working parts.

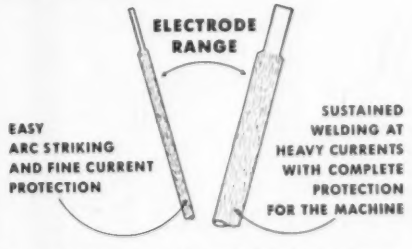
**8. Current Stays Set**—Once set, current settings do not change . . . are "locked" in position by rugged drum type holding devices. Illuminated dial shows setting of welding current.

**9. Steady Arc**—"Fleetwelder's" reactor control is a free circuit designed for high responsiveness to changing arc conditions.

**10. Compact, Portable**—Only 35″ high, 22″ x 26″ at base, "Fleetwelder" requires less space. Has connection for simple hookup to 220 or 440 volt line. Can be furnished with three wheel undercarriage for moving around the shop.

**11. Instant Penetration**—The extra current for arc striking also gives *complete penetration* at once . . . no more cold overlaps or partial penetration at the start of the weld.

## EXTRA RANGE TO SAVE EXTRA DOLLARS on light and heavy work


ELECTRODE RANGE
EASY ARC STRIKING AND FINE CURRENT PROTECTION
SUSTAINED WELDING AT HEAVY CURRENTS WITH COMPLETE PROTECTION FOR THE MACHINE

LOOK at the sketch. It shows *how* you benefit through "Fleetwelder's" wide current range in which maximum welding currents are 15 times minimum current values.

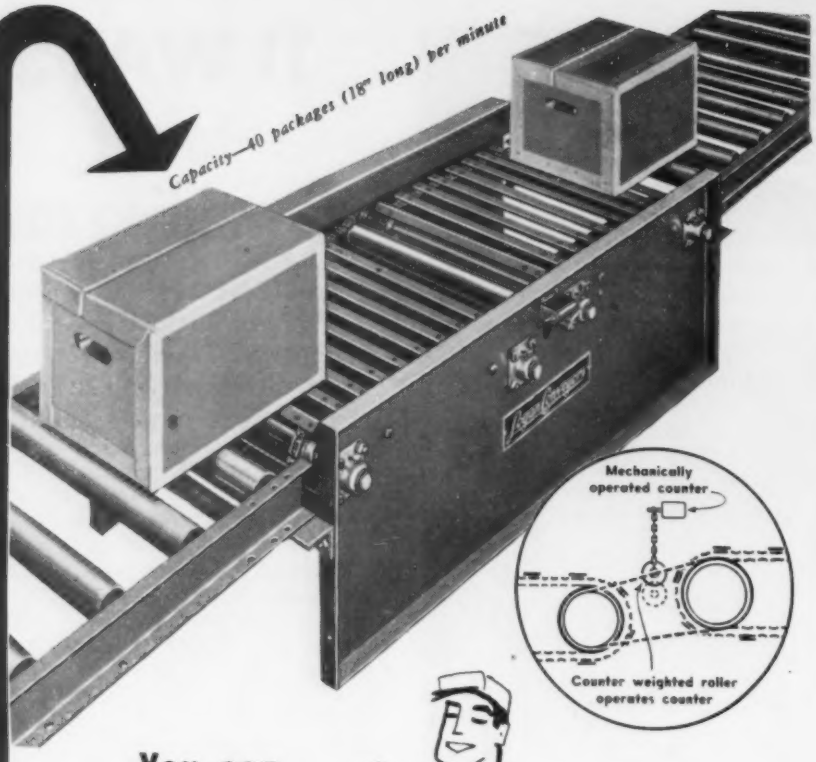
This *extra range* teamed with "Fleetwelder's" exclusive "Arc-Booster" insures fine currents *with instant arc striking* for light gauge jobs while with the same welder you have ample amps for sustained welding at high currents.

*No other AC welder offers this cost cutting combination . . .* and at such low cost.

**INVESTIGATE "FLEETWELDER" TODAY**—See what new advancements in faster, more efficient welding are being put to use by Lincoln to simplify and speed your operations and cut your welding costs.

**SEND FOR FREE BULLETIN 1314** *on "Fleetwelder". Available by writing on your letterhead to Dept. 1509.*

**THE LINCOLN ELECTRIC COMPANY**
**CLEVELAND 17, OHIO**
**THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT**

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LOGAN CO., 545 CABEL ST., LOUISVILLE 6, KY.


## —Personnel—

*Continued*

**George J. Bindewald,** promoted to general sales manager, Edison Instrument Div., THOMAS A. EDISON, INC., West Orange, N. J.

**George D. Gareau,** appointed general purchasing agent, AIRWAY PRODUCTS, INC., Pontiac, Mich.; and **A. L. Modreski** promoted to manager of production.

**Arthur J. Whitcomb,** appointed sales manager, Freyn Dept., KOPPERS CO., INC., Pittsburgh.

**Roy C. Hobson,** promoted to assistant manager, Chicago Works, NATIONAL MALLEABLE & STEEL CASTINGS; **Mark M. Miller,** becomes assistant to the vice-president in charge of sales; **John H. Murphy** becomes sales manager, Indianapolis, and **John A. Koehl,** named assistant sales manager same plant.

**Walter D. Kleine, Jr.,** appointed district representative, THE ELECTRIC AUTO-LITE CO., San Antonio, Tex., district.

**E. H. Parduhn,** appointed district engineering representative, in charge of the Pacific Northwest, THE OILGEAR CO., Milwaukee.

**Rodney H. Stebbins,** appointed district representative, GISHOLT MACHINE CO., Madison, Wisc.

### OBITUARIES

**J. Irvin Schultz,** 47, vice-president and treasurer, National Broach & Machine Co., Detroit, following a long illness.

**Harry M. Reed,** 53, a member of the board of directors, Vanadium-Alloys Steel Co., and secretary of Vanadium-Alloys and its subsidiary, Anchor Drawn Steel Co., Latrobe, Pa., at his home recently after an illness of several months.

**Bayard D. Kunkle,** 71, member of the board of directors and retired vice-president of General Motors Corp., recently at Henry Ford Hospital, Detroit, following a short illness.

**J. E. Paul,** 63, Philadelphia district manager, The Sharples Corp., suddenly at his home.

**J. C. Law,** general agent, Freight Dept., Toronto, Ont., Wabash Railroad Co.

# INFRARED Offers Economies in Continuous Process Heating

By I. J. Barber
Vice President
Fostoria Pressed Steel Corp.
Fostoria, Ohio

◆ Modern continuous process heating operations using infrared sources are economical, clean, and offer distinct advantages . . . Better control of the operation and elimination of overbakes resulting from conveyor system stoppages are clearly in the manufacturer's favor.

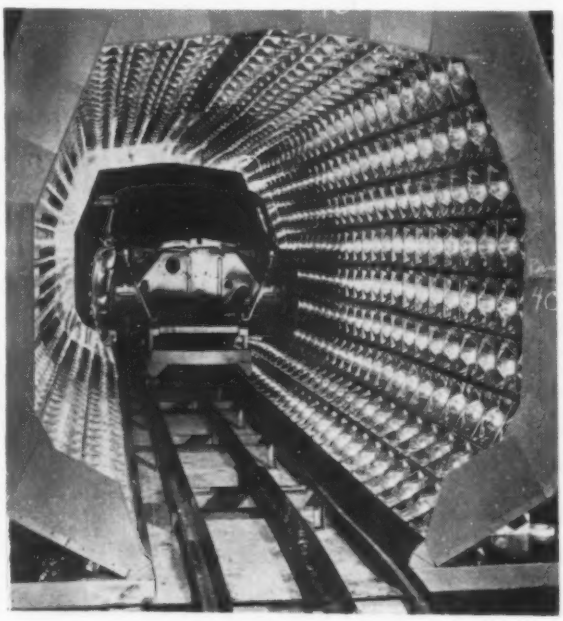
◆ Infrared heating is fast and clean . . . The two general groups of infrared generators, the high temperature filament lamps and the open or low temperature sources, can be successfully applied to a wide variety of process heating operations.

◆ INFRARED HEATING systems offer important advantages over other heating methods for low temperature service. This is especially true in continuous process operations requiring almost instantaneous control, and elimination of the hazard of overbake in the event of stoppages or failure of conveyer systems.

When ample time is available for convection processing, as 45 min and upward, temperature variations tend to disappear. Results are often satisfactory if oven air temperatures can approximate ultimate product temperature and there is enough time for stabilization.

With increasing costs of factory space, however, short cycles have become very desirable. To realize these shorter times in convection ovens, either air temperature or air velocity or both had to be increased. Very high air velocities required considerable power for blower operation, however and frequently these velocities hurt gloss and product appearance. Blowing air around in the oven intensified the dirt problem.

Where increased oven temperatures were used,



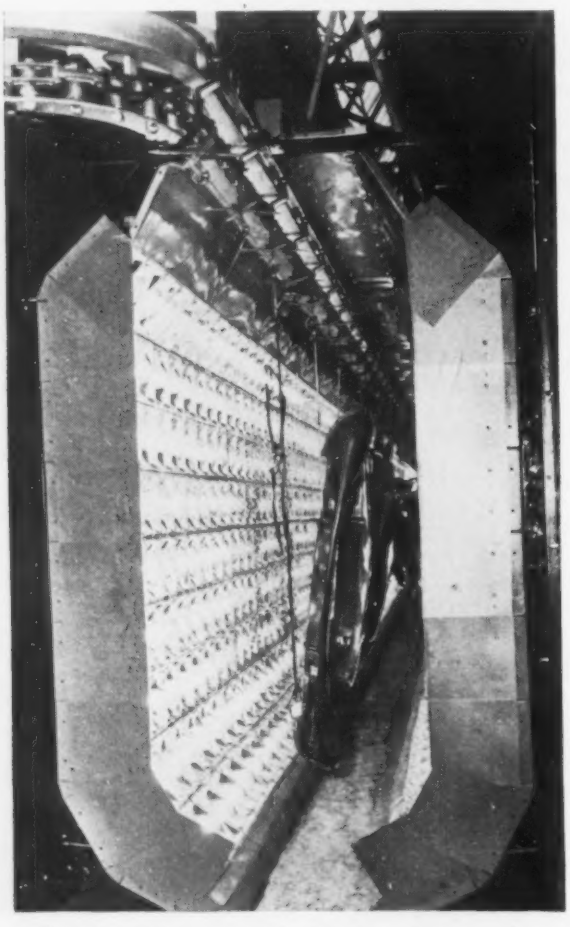
TYPICAL INFRARED oven using lamps and set up for baking auto body paints.

***Infrared radiation, properly engineered, provides overall efficiency to 60 pct . . .***

shutdowns often resulted in overbakes and damage to the product. The attempt to provide shorter cycles by convection ovens thus introduced quality and control problems. Tendency of a convection oven to "sag" when a heavy load is introduced made it difficult to stabilize on some operations.

Convection oven zoning has been only partly satisfactory and increases the hazard element by operating at higher temperature in the event of a line shutdown. Because much air heat in a convection oven goes into ventilation and wall losses, overall process efficiency is decreased with higher air temperatures. Readings of metal temperatures rather than air temperatures revealed important variations between parts.

Infrared ovens made short cycles feasible, offered the possibility of providing radial zoning to secure uniform climb in metal temperatures plus safety factors of immediate shutdown by mechanical and electrical interlocks, as well as operation in low solvent content atmosphere. In addition, it became economical to provide many more air changes which permitted cleaner processing.



CLOSE, FAST control of infrared oven eliminates overbakes due to conveyor stoppage.

Early use of infrared equipment was usually confined to small applications and small users. Often a combination of poor load factor and adverse utility rates existed. While the product was often superior to that obtainable by any other means, the process frequently cost the small user too much to run. Such experience led some to conclude that infrared, to be economical, had to be combined with convection.

Many attempts have been made to combine these methods, either throughout the cycle or through use of infrared preheat and convection hold zones. Recent analysis indicates there is little or no economical advantage in combining the two methods. Straight infrared radiation, properly engineered, provides efficiency to 60 pct, much higher than obtainable by convection.

### Infrared oven costs are competitive

Where electric infrared preheat zones are combined with fuel fired convection holding zones, there appears to be little gain over full radiant ovens. The combination of convective and radiant sections greatly complicates the cleanliness and maintenance aspects. The air movement in a straight radiant oven is slight, and consequently little dirt is carried to the product. Where considerable air velocities are introduced in a radiant oven, there is increased convection loss, product quality suffers in gloss and cleanliness, and oven maintenance is greatly increased.

Generally, properly engineered infrared ovens are competitive with fuel fired ovens in first cost, operating cost, maintenance cost and somewhat superior in quality of finished product.

Some infrared radiation exists with any object at a temperature higher than its surroundings. Conventional convection ovens provide a considerable quantity of heat transfer by radiation from heated walls. The higher the oven temperature, the greater the percentage of energy transmitted by radiation. High temperature kilns are probably 75 pct radiant as regards heat transfer. But no commercial oven or furnace is wholly radiant or wholly convective although fairly wide difference in percentages of each are involved.

The earliest commercial lamp installation used

**INFRARED SOURCES**
**Common Commercial Types**

| | Deg Kelvin | Less than 4 Microns | More than 4 Microns |
|---|---|---|---|
| Filament lamps | 2500 | 91.5 | 8.5 |
| Same at half voltage | 1860 | 83 | 17 |
| 1500°F elements | 1080 | 54 | 46 |
| 1200°F elements | 930 | 43 | 58 |
| 620°F panels | 600 | 14 | 86 |

## COMPARISON OF INFRARED GENERATORS

| Filament lamp (high temperature) sources | Applications and Advantages |
|---|---|
| 1. Low filament mass permits instantaneous response. | Paint baking—best film gradients. |
| 2. Small filament size permits efficient directional reflection. | Water evaporation—bulk quantities. |
| 3. Mass produced sources result in initial and replacement economies. | Irregular products—easier radial and longitudinal zoning. |
| 4. Little air heating permits quick starts and safe shutdowns. | Intermittent lines—safety during shutdowns. |
| 5. Lamp life of 5000 to 10,000 hours. | Fast control—essentially instant response. |
| 6. Absence of air heating losses permits higher efficiencies. | Lowest costs—initial and replacement sources. |
| 7. More uniform temperature gradient through film provides better quality product. | Shortest safe cycles. |

| Open or lower temperature sources | Applications and Advantages |
|---|---|
| 1. Greater mechanical strength. | Surface water dry off. |
| 2. Less color sensitivity. | Light sensitive materials (Photographic and blueprint). |
| 3. 5000 to 10,000 hours life. | Better efficiency on skin drying. |
| 4. High percentage surface heat on water dry off. | Glass heating. |
| 5. Smoothes out peaks and valleys when using interval timer control. | Single pass heating of translucent materials. |
| 6. Absence of occasionally objectionable glare. | Minimum space required. |
| | Less color sensitivity—on short cycles in particular. |

the carbon filament lamp at about 2000°K. The high filament temperature permitted a small mass, which made control by reflectors practical and permitted relatively instantaneous response to voltage changes. The sources did practically no air heating, since almost 75 pct of its energy was radiated in the region below 3 microns (83 pct for 2500°K). This made practical a glass enclosure which protected the source from serious convection loss. For commercial reasons, the principal source was shifted to the tungsten filament at 2500°K which is in wide use today.

Many people, guided by little or no experience, built home-made "ovens." Short lamp life and failure to accomplish the end result were frequent. Many users turned to the more rugged, nickel-chromium heating elements in ribbons, coils or encased in metal tubes. While these sources would do most of the jobs that the lamp would do and were more rugged and resistant to thermal strain, they had some disadvantages. Due to much greater mass, they were no longer immediately responsive to voltage control.

Longer wave length characteristics made them

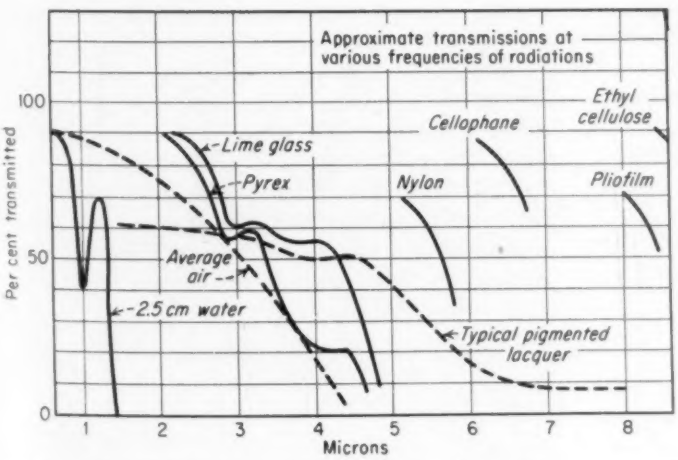



FIG. 1—Transmission range of most translucent materials falls beyond 4 micron point, as indicated.

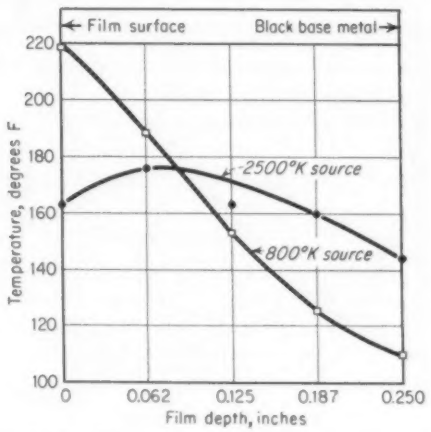



FIG. 2—Temperature readings across a 1/4-in. clear varnish film.

partly air heaters, a factor in oven design. Being air heaters, they required time to bring an oven to stability. Since they did not decrease rapidly in temperature, there was danger of overbake in event of accidental stoppage. They were not readily available in a range of interchangeable wattages for general equipment and did not lend themselves to the degree of zoning possible with lamp ovens. A much higher first cost and replacement cost limited their widespread use.

Relative absorptivity of different materials irradiated at different frequencies varies. Fig. 1 shows the transmission range of some translucent materials. Most fall beyond the 4 micron point. Equipment designed specifically for first

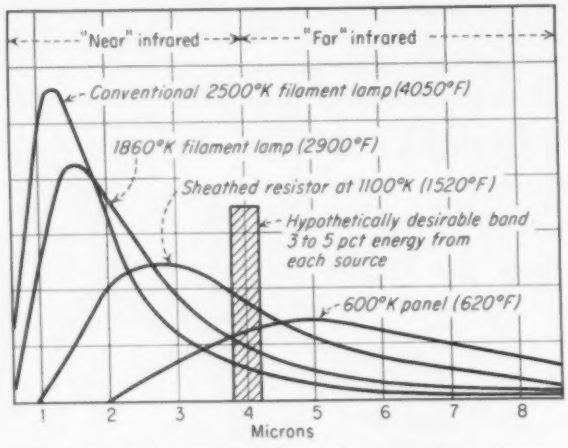



FIG. 3—Only small portion of energy from these sources is in 3.8 to 4.2 micron range.

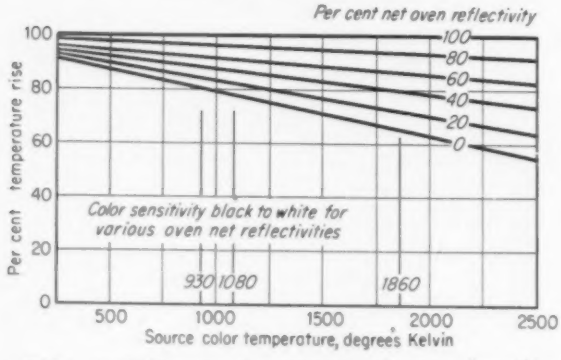



FIG. 4—Difference between peak wave lengths disappears as oven reflectivity increases.

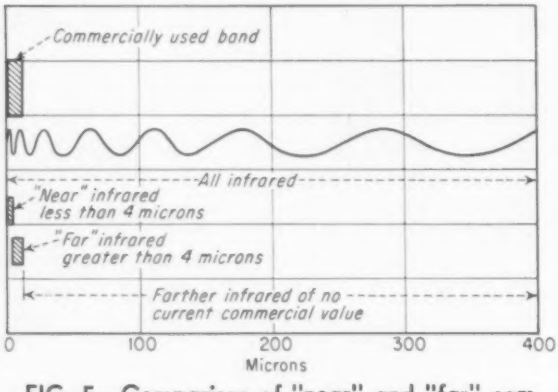



FIG. 5—Comparison of "near" and "far" commercially valuable infrared bands.

pass absorption on these materials should probably be operated at color temperatures in excess of this point, which makes them essentially black sources, i.e., sources with little or no visible radiation; operated at color temperatures in the vicinity of 6000° to 7000°K or lower.

Where the relatively transparent material is backed with a reflector permitting several passes of radiation back and forth through the material, the equivalent net absorptivity may easily be obtained with sources of much higher color temperatures—even including 2500°K. Similarly, it is often possible to run multiple passes of the same material in the path of one radiating source, which produces relatively the same effect of high absorptivity in the short wave range.

Many commercial infrared installations process paint on metal. Relative effects of high and low temperature sources on these films are of interest. While no practical method has been found to accurately read the temperature gradient across a 3 or 4 mil thick film of paint, it has been possible to determine the percentage of transmission at various depths and to determine the relative absorptivity of different types and colors of pigments.

### Convection process more damage prone

Pigmented enamels and lacquers absorb most of the radiation from a 2500°K source within the first 4 mils. Clear varnish films, however, transmit energy at 2500°K up to ¼ in. thickness. Thus, thin film gradients have been approximated by temperature measurements on a much thicker film. Fig. 2 shows the results of temperature readings across a wet clear varnish film ¼ in. thick.

At this thickness, practically all radiation would be absorbed. A gradient so established may then be treated as a magnification of the actual gradient on a 4 mil film. This assumes the thermal conductivity of the film near the surface would be similarly reduced, neglecting a small quantitative error, which will not, however, affect the basic conclusion illustrated in Fig. 2.

Thus, for example, without exceeding a film temperature at any point of 176°F, it is possible to process a film at an average temperature of 160°F where a high temperature source (2500°K) is employed. With a source of low color temperature (800°K), a maximum film temperature at the surface of 220°F was required for the same 160°F average film temperature. At equal oven ambients, this would indicate a surface convection loss 50 pct greater in the case of the low color temperature source.

On a critical material, it would therefore not be possible to safely process the film at as high a rate with a low temperature source as with a high temperature source. Since a low temperature source is more predominantly an air heater and convection processing on an equal cycle with infrared processing is somewhat more prone to

discolor or damage the product, this data ties in with previous conclusions.

Other low temperature sources are in pilot installations, not having attained wide use as yet. Among these are the low temperature, 500° to 600°F, panel of coated glass, metal or fiber glass plus Nichrome wire. This type unit must provide a surface largely all heated to give total intensity within the range of the other commercial sources. Consequently, they must be capable of operation at panel temperatures up to about 600° in order to compete. Like all of the sources except the glass enclosed types, they may be operated as low in color temperature as desired. Like the metal element, they have considerable mass and respond slowly to control.

Early development favored the idea that a fundamental spectral frequency based on resonance or its heating equivalent existed for specific materials and that extreme efficiency could be developed by providing radiation of exactly this frequency. It soon became apparent that with any known method producing heat radiation, the possibility of restricting it to a narrow band could be done only with filters. Since this was a subtractive process, about the only practical approach developed was the use of ruby glass to filter out the small proportion of visible light from the short end.

### No source completely color blind

Distribution curves reveal that for sources from 2500°K to 600°K, which spans the entire practical range, there is considerable overlap between all temperatures represented, Fig. 3. Thus, at 4 microns, it would be found that all sources here considered would yield approximately 5 pct of their energy between 3.8 and 4.2 microns. It would be necessary to waste 95 pct of the radiated energy in some filtering medium if it was desired to radiate only in this band.

Difference in color absorptivity presents a steadily changing curve almost linear in form. No source is completely color blind, but becomes less color sensitive with increasing wave lengths. Moreover, any body totally surrounded by 100 pct reflective enclosure becomes a perfect black body.

Thus there is no difference in the effective absorptivity of a black object and a white object irradiated by waves of any length where the target and source are surrounded by a perfectly reflective sphere such as one gold plated on the inside. Any difference between peak wave lengths disappears under these circumstances, Fig. 4. An approach to this condition can be made by having as much as possible of the oven interior reflective.

In a long cylindrical tunnel, it is possible to attain as high as 80 pct reflective walls. Here, the span between color extremes becomes quite narrow. An oven with a 2500°K source and a 70 pct reflective interior may be less color sensitive than an oven as high as 20 pct reflective, equipped with 930°K elements. Since many ovens using the lower temperature sources are built with little regard to reflective walls, designating such equipment as color blind is not factual.

Use of these various sources introduces problems of oven construction. Of the sources available, practically all may be operated over a range of temperatures and frequencies. An incandescent lamp in a glass envelope may be operated safely at filament temperatures from 3000°K to about 1500°K, where glass absorption becomes excessive.

Conventional 2500°K lamps may be operated within the range of 1500° to 2700°K (filament temperature) by varying voltage. From 1100°K down to 600° or 700°K, open or sheathed resistors are available. Where primarily "far" infrared radiation is desired, heated panels of glass or metallic or fiber glass pads are available.

With these, to get sufficient intensity within a general area without exceeding the desired color temperature, a heated area nearly equivalent to the total area of the over wall is needed. The totally heated panel represents what might be classified as the only predominantly "far" infrared source, see Fig. 5, commercially available today. Resistance units may be operated at low enough temperature to meet this classification but require so many elements within a given area as to be commercially impractical.

Other elements such as glass tubes and fused quartz envelopes containing resistance elements, ceramic coated resistance elements, etc., are commercially available. All provide radiation corresponding to their position in the spectrum.

The two extremes currently in use are represented by the 2500°K lamp which has 91½ pct of its radiation at wave lengths shorter than 4 microns and hence might be classified as being 91½ pct a "near" infrared source. Heating panels at 600°K have only 14 pct of their energy below 4 microns and consequently are 86 pct "far" infrared sources. A tabulation of common commercial sources is given in the table.

### Ovens must maintain reflectivity

Since the "near" infrared sources lose little of their radiation by absorption in the air, they are primarily directly radiant units. Ovens designed for their uses must have:

1. Highest oven wall reflectivity possible.
2. Reflective distribution control for initial uniformity of impact.
3. Minimum of turbulence and air movement, good housekeeping.

Such ovens require attention to maintenance of proper reflectivity. Conventional exterior or between-the-wall insulation is secondary.

Ovens constructed for use with the "far" infrared sources, more predominantly air heaters, require more. Thus the maintenance of a high ambient within the oven indicates a desirability of wall insulation and other forms of heat retention.

*Bodies get 90,000 v—*

# Electrostatic Spray Method PRIMES CAR BODIES

By Herbert Chase
Consultant
Forest Hills, N. Y.

**◆ Nine spray guns at each end of two booths apply undercoating to Studebaker car bodies in half the time required for hand spraying . . . Grids charged with 90,000 v create a strong electrostatic field into which the paint is sprayed and attracted to the grounded bodies.**

**◆ Uniform prime coats provide good surfaces for smooth, durable finish coats . . . Prime coats are sufficiently thick for proper wet sanding . . . Production is consistently high by this new method—about 90 bodies per hr . . . Rejects are few and paint losses low.**

◆ RECENT REVISIONS in the body plant of Studebaker Corp., South Bend, Ind., are intended to produce better, longer-lasting finishes on new lines of passenger cars and other sheet metal parts. Although economies were considered, the prime objective was to obtain superior coatings capable of resisting extreme exposure conditions over long periods.

Special importance was placed on obtaining an enduring undercoat of sufficient thickness to withstand proper wet sanding and still be an adequate film to serve as a good base for finishing coats. This was done with a No. 1 Ransburg electrostatic spray system—the first for auto body finishing. Fig. 1 shows such a setup at the entrance end of a spray booth.

Each end of the booth has nine spray guns directed inwardly. Inside near each end is an electric grid charged with 90,000 v which creates an electrostatic field. As paint is sprayed into this electrostatic field, it is attracted to the body which is grounded. There is no overspray and body surfaces receive a uniform coating.

Each body passing through the booth is mounted on a dolly advanced by a floor chain. The dollies operate switches which turn the guns on and off automatically so that they operate only when a body is in spraying position. Bodies are spaced only a few feet apart. However, larger gaps are left occasionally to allow the operator to clean nozzles, adjust the guns and to wipe off the electrodes. This aids in obtaining consistently uniform coatings.

Guns are adjusted for 15 to 18 psi. The primer-surfacer, which is a Dupont oil-base type, is held at 13 viscosity as measured by a No. 7 Ford cup. Two electrostatic booths are in series, spaced to provide for drying between, because it is not desirable to apply the specified film of 2.5 mil thickness using only one booth.

The 2.5-mil thickness is essential because water sanding, following drying, removes as much as 1.5 mils. A 1-mil thickness, without bare spots, is necessary to give the finish long life.

A third booth, not electrostatic, is used to hand spray body interiors with primer-surfacer. The rear deck is also sprayed in this booth since it is not feasible to spray interiors electrostatically. Although the entire body can be hand sprayed, the finish will not be as uniform. This applies particularly when operators become fatigued near the end of a shift.

### Aim for thick, even undercoat

The main objective of the electrostatic setup is to apply the undercoater evenly and in sufficient thickness for long, durable service. This objective is attained partly because there is very little overspray, and the electrostatic system promotes uniformity. Also, because there is no overspray, considerably less paint is used.

After the primer-surfacer is applied, each body enters a gas-fired oven in which it remains for 1 hr at a maximum temperature of 280°F. The body is then spot sealed by hand and a knife glaze is applied over soldered seams. This is followed by infra-red baking in a booth which raises the temperature of the body to 200°F before it emerges into the water sanding area.

MR. CHASE, engineer, former trade magazine editor and author of engineering texts, is noted for his articles on the latest industrial developments.

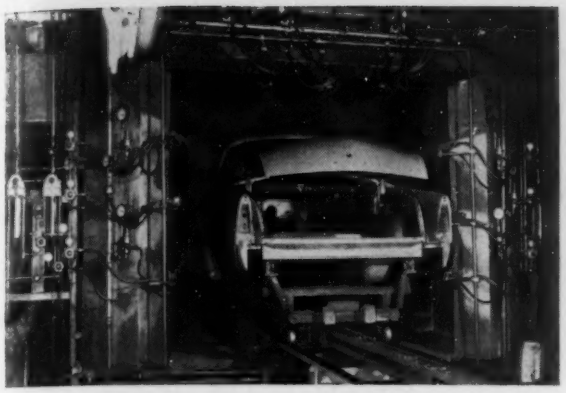


FIG. 1—Body enters electrostatic spray booth for prime coating. Nine spray guns at each end of booth turn on and off when dolly carrying body trips limit switches.

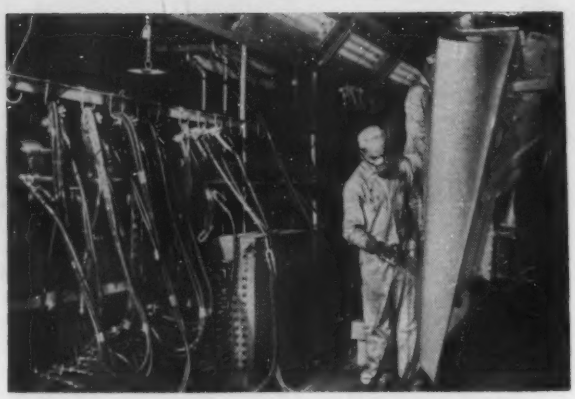


FIG. 2—Enamel finish coats are sprayed on fenders and other body parts by hand. Enamel is heated to give higher gloss and longer life. Ventilation rids booth of fumes, dust.

Sanding is done by hand because it is difficult to avoid sanding through to bare metal with mechanical sanders. Hand work not only avoids this but leaves the desired minimum thickness of primer-surfacer. After water sanding, bodies go through a dry-off oven. Garnish moldings and the shelf back of the rear seat are then hand sprayed with finish coats and the overspray is wiped off with a solvent.

Bodies then go through hand spray booths where they receive three coats of synthetic baking enamel. Thinner is added to the enamel to provide a set viscosity and each color used is checked and circulated continuously.

Sheet steel parts, such as fenders, are sprayed separately on conveyor lines as may be seen in Fig. 2. In the initial operation after Bonderizing, a black flowcoat primer is applied. The primer is an oil-base-plus-resin type pigmented with zinc oxide and carbon black. Flowcoating is done as the parts advance on an overhead chain between a series of spray jets which coat all surfaces.

After coating the fenders, excess primer drips off for 20 min and is recirculated. Fenders are then baked for 50 min at 350° to 355°F.

Since the prime coat is a heavy one, it is not rubbed through in sanding and serves as an excellent ground coat for the three enamel coats which follow.

Enamel coats are applied hot. This permits the use of less thinner and yields more body, more gloss and better apparance as well as longer life. Enamel is applied by hand spray, using two guns for each body color. Heating is done with exchangers made of coaxial pipe, shown in Fig. 3. A central passage carries paint while pipes inside and outside of this central channel carry water heated to 180°F. Thus, heat is applied to both sides of the paint channel.

Paint leaving an exchanger flows through a hose to a spray gun. Paint which is not sprayed returns via a second hose and is reheated. Make-up, coming from a supply tank, is also heated. A 20°F temperature drop occurs between the exchanger and the gun, so that the enamel is sprayed at about 160°F.

Heating of paint is done with a Fostoria system. Water flowing into electric heaters is automatically controlled so that it may be heated to 180°F before being delivered to the exchangers. Each spray gun circuit has an exchanger. After spraying, each of the three coats applied is baked separately.

Normal production of body shells is about 90 per hr. Actual spraying time is about half that required for hand spraying. Being completely automatic, coatings are uniform, rejects are few and production remains consistently high.

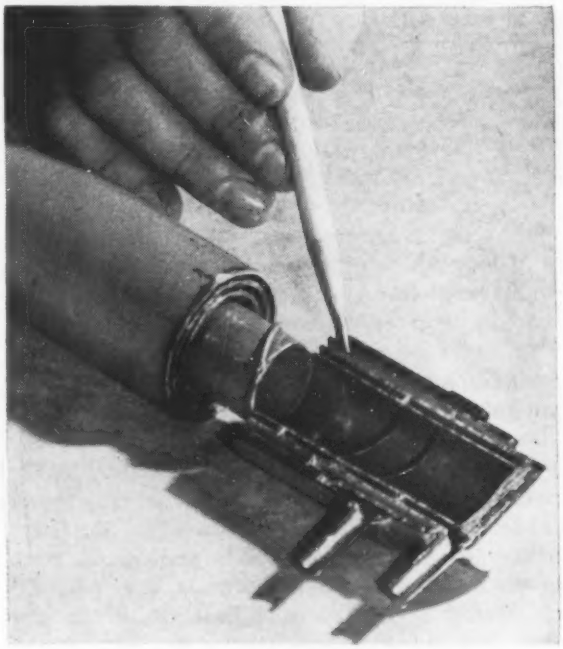


FIG. 3—Paint circulates spirally through central passage of this heat exchanger and picks up heat from water jackets on either side. Paint flows more freely when heated.

*Fixtures come first—*

# Tumble Large Precision Parts TO CUT FINISHING COSTS

By Wayne Stone
Process Engineer
Bridgeport-Lycoming Div.
Avco Mfg. Corp.
Stratford, Conn.

◆ Reductions in burring and finishing costs of major precision aircraft engine parts have resulted from a program of successful tumbling of large parts at Bridgeport-Lycoming . . . Unlike small parts which can roll "loose" in the chip mass, successful rolling of large parts depends on design of suitable holding fixtures.

◆ The tumbling program, instituted in 1952, has shown impressive reductions in bench burring and grinding and polishing times . . . Rigid control of rolling operations, with careful inspection both before and after, have made the process pay off on a production basis.

**Part II**

◆ LARGE, PRECISION PARTS for aircraft engines are being successfully tumbled on a production basis at Bridgeport-Lycoming Div., Avco Mfg. Corp., Stratford, Conn. Unlike smaller parts which can be rolled loose* in the tumbling media, large parts present special problems.

To meet these problems a large stationary fixture machine made by the Roto-Finish Co. was used. It has about 36 cu ft capacity, rotates in either direction, and can be timed to reverse itself in a predetermined cycle. Slots in the sides or cylinder ends hold fixtures in place.

A door which occupies two of the eight sides also serves to lock fixtures in place. When the machine rotates, fixture and parts also rotate. The parts become integral with the rotating cylinder and pass through the mass with considerably more abrading action than in the "loose" method.

First problem encountered in tumbling major parts was that of designing suitable fixtures to hold the parts. Considering weight and size, fixtures had to be designed to present the part in its rotation through the mass in a position calculated to achieve the best results in the shortest time.

Parts must be locked securely in the fixture. There can be no possibility of the part loosening. At the same time it is necessary to avoid marring finished surfaces, which in many cases are ground and lapped. The fixture must be completely rigid without the massiveness usually associated with strength and rigidity in holding fixtures. Large solid areas, plates or braces cannot be used since the parts must be as completely exposed as possible, inside and out, so the processing mass will have free access to all edges and surfaces.

Since there were no precedents to serve as guides, caution was necessary in both the design and cost of fixtures. Though the problems connected with the rolling of a part are exhaustively studied, it is always possible that the resulting fixture may not be all that is to be desired and may have to be rebuilt. Many hours have been spent in the design of first fixtures and, even then, several required alteration after being tried.

The fixture mounted parts, Fig. 14, are magnesium, each about 19 in. in diam and slightly over 7 in. from side to side. The fixture was designed with gusset braces at the bottom so that it would stand on the floor while the parts are mounted. The key flanges on the fixture sides slide fit in the machine slots. The part is mounted to expose as much surface as possible to abrading action and interfere as little as possible with movement of the mass. In using

* Part I, The Iron Age, Sept. 24, 1953.

this fixture, mounting flanges which bolt to the part are attached at the bench. The part is then lifted, hung in the fixture frame and locked in place with hand knobs. The loaded fixtures are placed in the machine by means of a crane. This part is processed two at a time, as shown, in 2400 lb of No. 4 granite chips for 4 hours.

In one model of this part oil passages intersect within the walls of the piece. Since thorough visual inspection is not possible, it is impossible to be certain that no small worn-down chip or foreign matter has become lodged in these passages.

Chip size is chosen with consideration for the work to be accomplished and of a size to prevent lodging where possible. However, large parts often have such a variety of different size holes that the perfect chip to eliminate lodging is not always possible. A solution to this problem was found by waxing the intersecting oil passages. The wax is melted and poured into the passages before rolling and melted out afterwards.

With small parts the time per piece saved is usually small because total burring time is small. Saving is judged by percentage of previous time and as the quantity run at any one time increases the saving increases. With major parts, extensive time is spent in burring so that often a small percentage of saving means a considerable time saved.

The previous burring time in this case was 151 minutes. Present burring time plus rolling time is 90 minutes. Tumbling saved 61 minutes per piece or 40.4 pct of previous burring time. Applied to a steady production schedule such savings become substantial.

### Special clamps developed

The magnesium nose section, Fig. 15, presented difficulties in fixture design. This piece is about 22 in. in diam with the small hub bore approximately 7¼ in. in diam. The pot is 15 in. front to back. If held on either the large flange or the small bore or both, these surfaces would receive no abrading action. Use of holes in holding was discouraged for the same reason.

Fig. 15 shows how the parts are exposed inside and out. The machine is tilted forward to show how the mounting bar fits in the machine slots. When the assembly is in the machine a bar is placed in each slot. When the machine door is clamped on, the mounting bar is held securely. The square mounting bar passes through both parts, leaving ample space even in the small bore for the action of the processing mass.

Inside each part a three-armed yoke is locked in place on the center bar. Pads at the ends of the three arms contact and support the sloping inner wall at three points. Since these spots were covered by the pads during rolling they received no action and show up in different color after processing. While similar spots appear on the outside wall, the parts are painted before final assembly and do not show. To support the

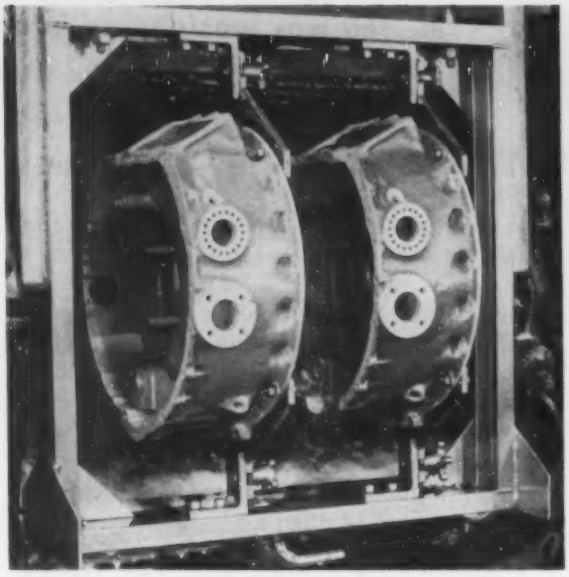


FIG. 14—Large magnesium parts, 19 in. in diam and 7 in. side to side, are rolled two at a time. Fixture stands on floor while parts are mounted. Sides of fixture fit in slots in tumbling barrel.

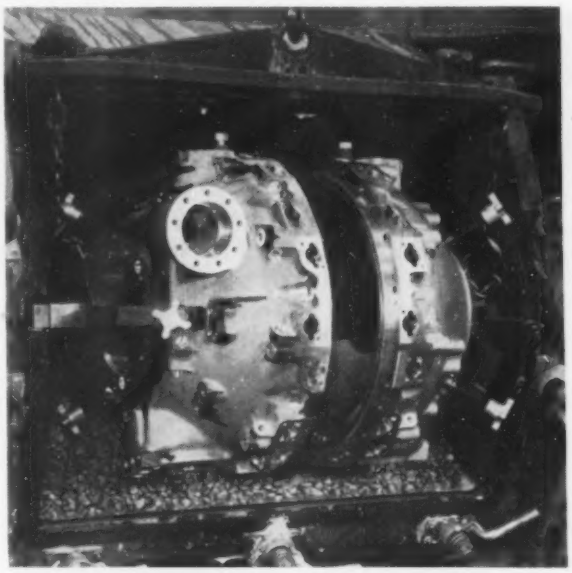


FIG. 15—Designing fixture for this 22-in. magnesium nose section proved difficult. Fixture clamps parts on three points of wall, does not touch machined surfaces.

outside of the parts a similar three-armed yoke was used. Here the pad ends were made adjustable with the hand knobs, Fig. 15. Sloping outside walls were chosen as locating surfaces because these surfaces require least rolling action.

Hand knobs are used wherever possible in fixtures to reduce loading time. To load nose sections on the fixture, the center bar is placed in a stand which holds it at midpoint. With the inner yokes already placed and left locked in position, the part can be quickly positioned over the bar and on the three inner arms. The outer yoke is then assembled and the hand knobs tightened. Inner yokes must be placed far

***Melted wax was poured into small oil passages to keep out fine chips . . . After tumbling, wax was melted out . . .***

enough apart to allow free access to the inside of the part.

Intersecting oil passages are waxed before and dewaxed after rolling. The nose section is processed in 2400 lb of No. 4 granite chips for 3 hours. Bench burring time on this part before tumbling was applied was 140 minutes. Present burring time plus Roto-Tumble manhour time is 85 minutes. The 55 minute saving per piece is 39.3 pct of previous bench time.

The aluminum parts shown in their fixture, Fig. 16 presented two new problems. The part is about 17½ in. in diam x 3¾ in. through, has nine thin vanes. When rotating in one direction the vane end entered the mass straight but when the machine was reversed, the outer end of the vane entered the mass at a slight angle and the vane end was badly rolled over. This meant the part could be rolled in one direction only and had to be mounted with all five parts facing the same way.

In addition, a slight rollover developed from chip impingement on the vane end which entered the mass straight. This was counteracted by completely covering the parts with processing media. The vanes are completely immersed during processing.

Chip mass consisted of 2000 lb of No. 5 and 1000 lb of No. 6 granite chips with a running time of 3 hours, five parts per load. The saving on this part should prove considerable, since the vane side must be polished free of all ripples and much polishing jack time as well as burring time has been saved.

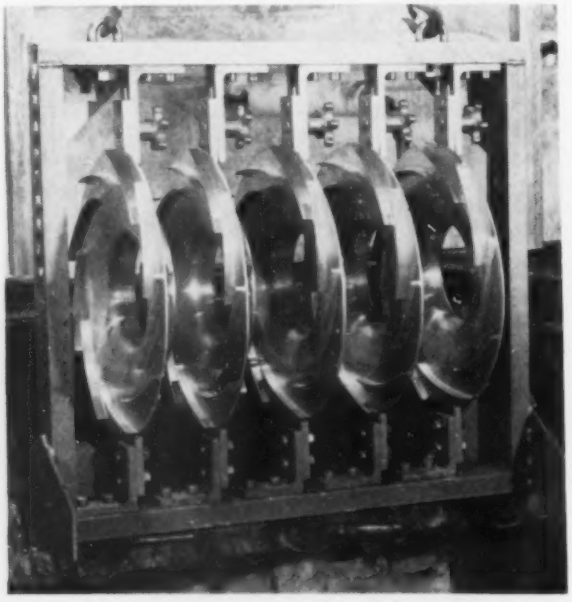


FIG. 16—Vane ends on these aluminum parts rolled over in tumbling. By correct fixture design and covering parts completely during tumbling, rollover was eliminated.

The magnesium part, Fig. 17, is about 20 in. in diam by 4 in. through and one of the most closely dimensioned parts made at Bridgeport-Lycoming. The fixture for this piece is similar to that of the previous part, but only three can be rolled at a time. Numerous oil passages require waxing to prevent small chips lodging. Impingement resulted from the part's forceful entrance into the mass surface during rotation, it was found. Solution was found in almost covering the parts with 2000 lb of No. 4 granite chips and processing for 3 hours.

### Finishing adds strength

Two models of this part are rolled, one having more bores and holes than the other, and thus having more edges to round and deburr. Saving on one model amounted to 31.4 minutes per piece, while the other more complicated piece resulted in a 57 minute saving per piece.

The chrome-moly crankcase, Fig. 18, mounted on its fixture and held in the loading stand is about 23 in. in diam and 9 in. front to back. This part is subjected to great stress and must be very carefully machined. It is made as two separate halves which are bolted together for finish machining as an assembly.

The rolling fixture had to hold the part, expose all surfaces and, at the same time, eliminate any possibility of twisting strain which would produce misalignment between the halves. Further, the wall between the hub and the outer flange is less than ⅛ in. thick. The part cannot be held by the flanges or in the hubs since these surfaces would then receive no action. The piece cannot be held by locating anywhere on the outside. Thus, it was necessary to hold this approximately 80-lb part from the inside without obstructing the action of the mass upon the interior. The part is machined and ground all over and requires all-over finishing to increase strength under stress.

### Center bar and yoke hold part

The tumbling fixture has a square center bar and a strong three-arm yoke which holds the part on the bolting lugs were used. Two arms of the yoke are fixed to a center collar which fits the center bar. The outer ends of these arms are cup-shaped to fit over two of the bolting lugs. The third arm is detachable, has a swivel cup at the outer end to hold the lug and screws into a tapped hole in the collar.

In use, the mounting bar is placed in the loading stand with two stop collars already placed and locked. While the part is on the bench the yoke is assembled within the case and locked. The piece can then be lifted with a

FIG. 17—Two sides of a very closely dimensioned magnesium part made at Bridgeport-Lycoming. Oil passages are filled with melted wax before tumbling to prevent chips from lodging in these passages. After rolling, wax is melted out of part.

crane and loaded on the bar. A second stop collar locks it in place against the first collar. In this way the part is entirely exposed, inside and out, yet held securely enough to withstand the constant reversal of the machine necessary to get sufficient abrading action to affect the hard steel, Fig. 19.

Prior to rolling, the flange undercuts under the lips at the outer diameter of the pieces were ground before the large holes through the flange were redrilled and reamed. This left large hanger burrs on the underside of the flange which could not be removed in rolling. By grinding the undercut *after* the holes are finished the hanger is removed in the grinding, leaving a sharp edge for tumble.

From experimental runs it was possible to set up burring operations specifying exactly what was to be burred and what was to be left sharp. All edges are broken and radii formed through the combined efforts of the burr bench and rolling. Resulting finish and overall blending and uniformity is thought to be unique in steel crankcases. Part strength has been increased and general appearance improved tremendously.

Overall saving will more than pay for the machine and fixture. Burring and polishing time before this part was tumbled was 239 minutes per piece. Now tumbling and burring time total 172 minutes per piece.

Tumbling is not a panacea for all finishing problems but a definite manufacturing process which can be applied and controlled like any other manufacturing method. Rigid control is necessary if the process is to be successful. Careful inspection prior to tumbling for nicks, scratches and machining or burring operations not performed, as well as inspection after processing is necessary.

When the formula for a part has been established, one copy of a record card is held in Process Engineering and another is filed in the tumble department. As a further control, an operation sheet is provided covering each phase of processing.

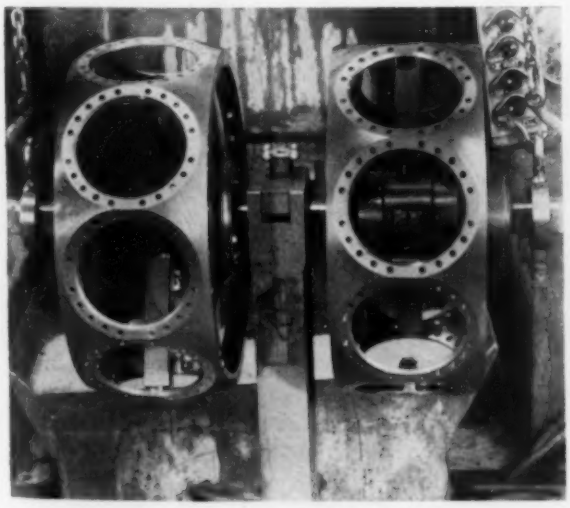


FIG. 18—Chrome-moly steel crankcase parts are rolled, two at a time, mounted on a special holding fixture. Stops permit free access of chips to inner and outer surfaces.

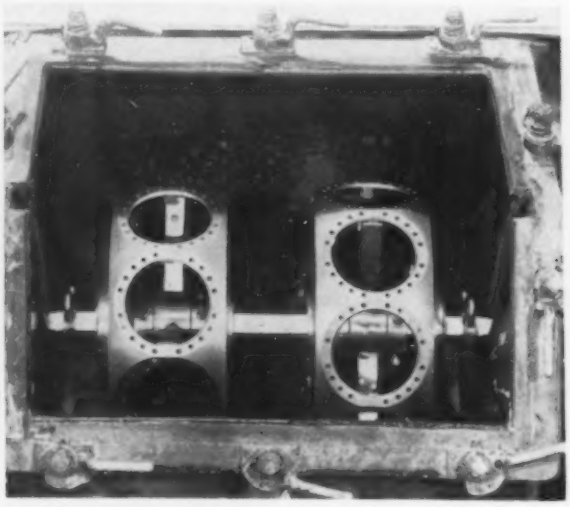


FIG. 19—Three-arm yoke holds parts securely. Mounting bar is placed in machine with two stop collars placed and locked. Fixture is lifted in and out by crane.

*Two are better than one—*

# TREPANNING TOOL

**By Walter Jellig**
Chief Tool Engineer
Ford Instrument Co.
Div. of the Sperry Corp.
Long Island City, N. Y.

◆ Two cutters in a specially designed trepanning tool cut machine downtime and improved production on a helicopter power transmission bevel gear at Ford Instrument . . . Burden on hard pressed tool maintenance facilities was lightened by the novel tool design.

◆ Problem arose in machining a groove around the hub and under the flange of the SAE 4130 steel gear blanks . . . Blades for the new tool are cut on a Sheffield profile grinder . . . Serrations in cutter bodies and on tool holder simplify location of cutters . . . Original cost has been more than amortized in a year of continuous production without breakdown due to cutting tools.

◆ GREATLY IMPROVED cutting efficiency, reduction in machine downtime, and lightening of the load on tool grinding facilities were advantages resulting from redesign of a cutting tool used at Ford Instrument Co. Div. of the Sperry Corp., Long Island City, New York.

Machining SAE 4140 steel heat treated to Rc 32 to 38, always a problem, is especially troublesome on the type of cut shown in Fig. 1. For a production run on this helicopter power transmission bevel gear it was necessary to bore a groove around the hub and under the flange. Single point carbide tools such as that shown in Fig. 2 averaged only one part per tool with machine downtime exceeding running time by almost two to one.

Complete destruction of the tools once they became dull, and an occasional mutilated part added to the difficulties. In addition, toolmaking facilities could not grind tools fast enough to feed the machines. Disadvantages of the single-point tools on this job included excessive overhang, weakened cutting edge because of the method of grinding clearance, and difficulty in making adjustments when the tool was mounted in the machine.

The entire problem was reexamined with greater rigidity as a primary consideration. The machine used was a 5 DE Potter & Johnston automatic chucking machine of rugged construction and power to spare. To make full use of the machine's potential, the tools had to be of robust character, able to stand tremendous cutting pressures. The characteristic rigidity of the trepanning tool led to its adoption. With this tool it was possible to have full support under the tool bit. By using two tool bits, diametrically opposed, the cutting forces would be tangential ones and easily resisted by tubular construction, Figs. 2 and 3.

Coolant was fed from the turret of the machine through the center of the bar and also directed at the cutting edges through oil holes properly disposed in the holders.

Chip clearance proved quite a problem. There had to be sufficient chip room in front of the cutting edge. This was done without weakening the tool by milling an ample clearance as shown in Fig. 3. Then the chips had to be broken. The nature of the contour helped but the major factor in breaking the chips was the feed employed, a speed of 120 sfpm and a feed rate of 0.008 ipr.

The feed used provided broken chips without the aid of a chip breaker. Finally the broken chips were prevented from entering the internal

# SPEEDS GEAR PRODUCTION

cavity of the trepanning tool by a copious flow of coolant gushing from inside the tools around the tools bits carrying the chips out with it.

Since the turret of a 5 DE Potter & Johnston advances to precisely the same position on each index, and since the stop position of the turret cannot be regulated from face to face, adjustment of the tool bit in the machine was of prime importance. Adjustment was achieved in the smaller tools by cutting a modified square thread on the shank of the trepanning tool and using a threaded stop collar to bank against the tool holder, Fig. 3. On larger tools, where this shank design was too weak to be practical, a preset position was determined by a layout and all bits were set to pre-determined dimension, Fig. 3.

The cutter blades, Fig. 4, were form-ground from blanks supplied by the O. K. Tool Co. The back of this blank was milled with "V" serrations of 1/32-in. pitch and the blanks were heat treated to Rc 67 to 68. Material for the blades was Vasco supreme high speed steel containing 1.5 pct C, 12.5 pct W, 4.75 pct Cr, 5.0 pct V, 5.0 pct Co.

The cutter body was made from SAE 4140 heat treated to Rc 38 to 40. This provided a tool of optimum physical properties within a machinable range. The body, with the exception of the broached serrations, was manufactured on standard equipment using standard tools. The work was clamped in a dividing head mounted on the machine table. The slot in the cutter body to be broached was properly positioned and brought up into the serrating tool by the use of the up feed of the table.

The serrating tool was held in position by a series of 5° taper wedges which were placed in back of the tool to keep it from springing away from the work. The dividing head was indexed 180° and the opposite slot was then serrated. After the slots had been serrated, one serration in each slot was measured to determine its distance from the center of the cutter body. This dimension was stamped on the body and was used as a reference for the proper grinding on the form on the blades.

For simplicity of maintenance it was necessary to be able to grind the form in the blanks before assembling them into the cutter body. One blade was to cut the inside diameter of the trepanned cavity and the other the outside diameter. Since they had to blend where the cutting action overlapped, it was imperative to grind the form in relation to the established serration in the cutter body. This operation was done on a Sheffield profile grinder, Fig. 5, by mounting the cutter blade on a fixture

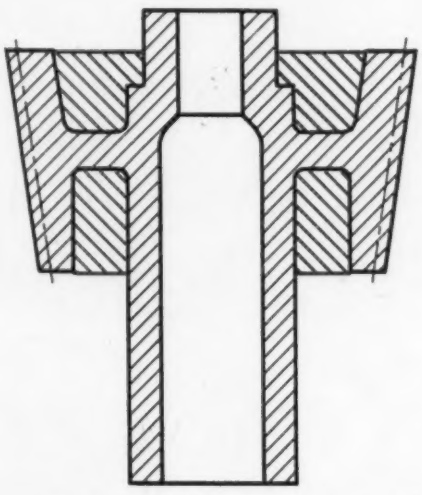


FIG. 1—Boring out SAE 4130 steel under flange of this bevel gear posed machining problem. New trepanning tool proved answer.

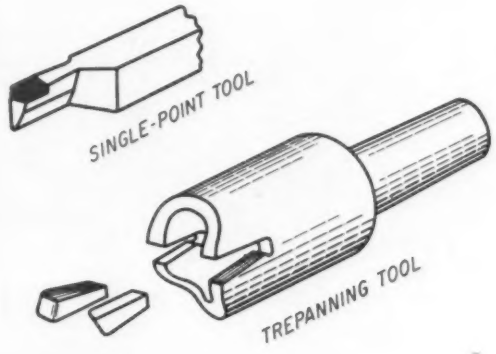



FIG. 2—Single point carbide tool was replaced by tool with two tool steel cutters. Downtime was practically eliminated.

that positioned the serrations, and then grinding the form to a 50 to 1 layout. The fixture edge or zero line was indicated on the 50 to 1 layout to assure the proper relation.

With this method the forms either match radially within a few thousandths or are out of phase by an error which is a multiple of a serration pitch of 1/32 in. The proper radial relationship can be obtained when setting the blade by simply setting them in the cutter

***Serrations key cutters to holder, simplify radial settings . . .***

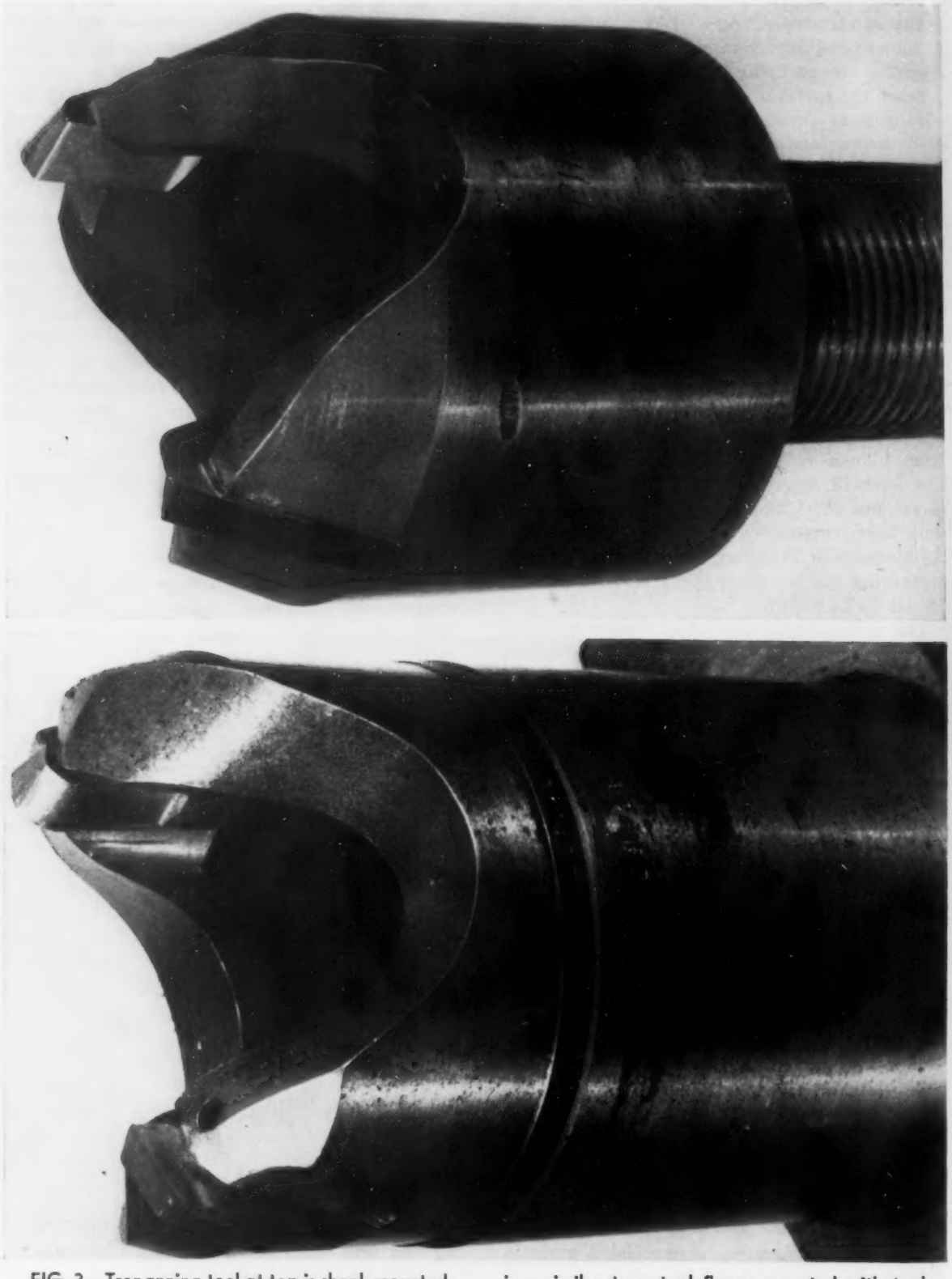


FIG. 3—Trepanning tool at top is shank-mounted, uses square thread for depth adjustment. Below is a similar type tool flange-mounted with tool bit preset with respect to the flange.

### *Forms were carefully ground to get proper blade setting . . .*

body loosely and quickly checking with a scale.

To obtain the proper depth setting of the cutter blades, the forms were ground in relation to the bottom edge of the blades indicated on the 50 to 1 layout. By measuring the distance between the bottom of the slot and the bottom of the blade, it was possible to position accurately the blade in the cutter body. The distance could be varied by using a shim between the face of the blade and the body.

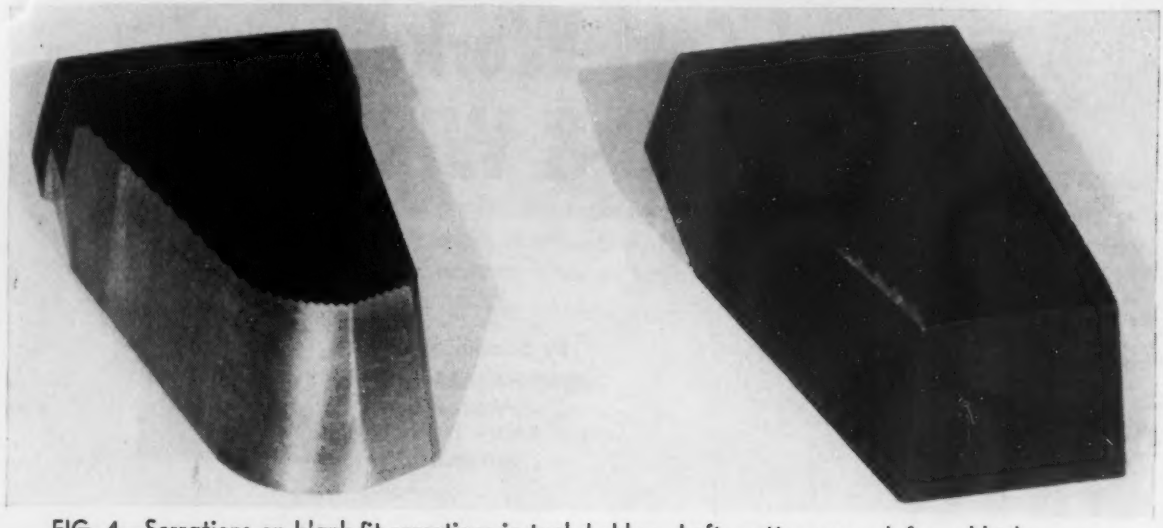


FIG. 4—Serrations on blank fit serrations in tool holder. Left, cutter ground from blank.

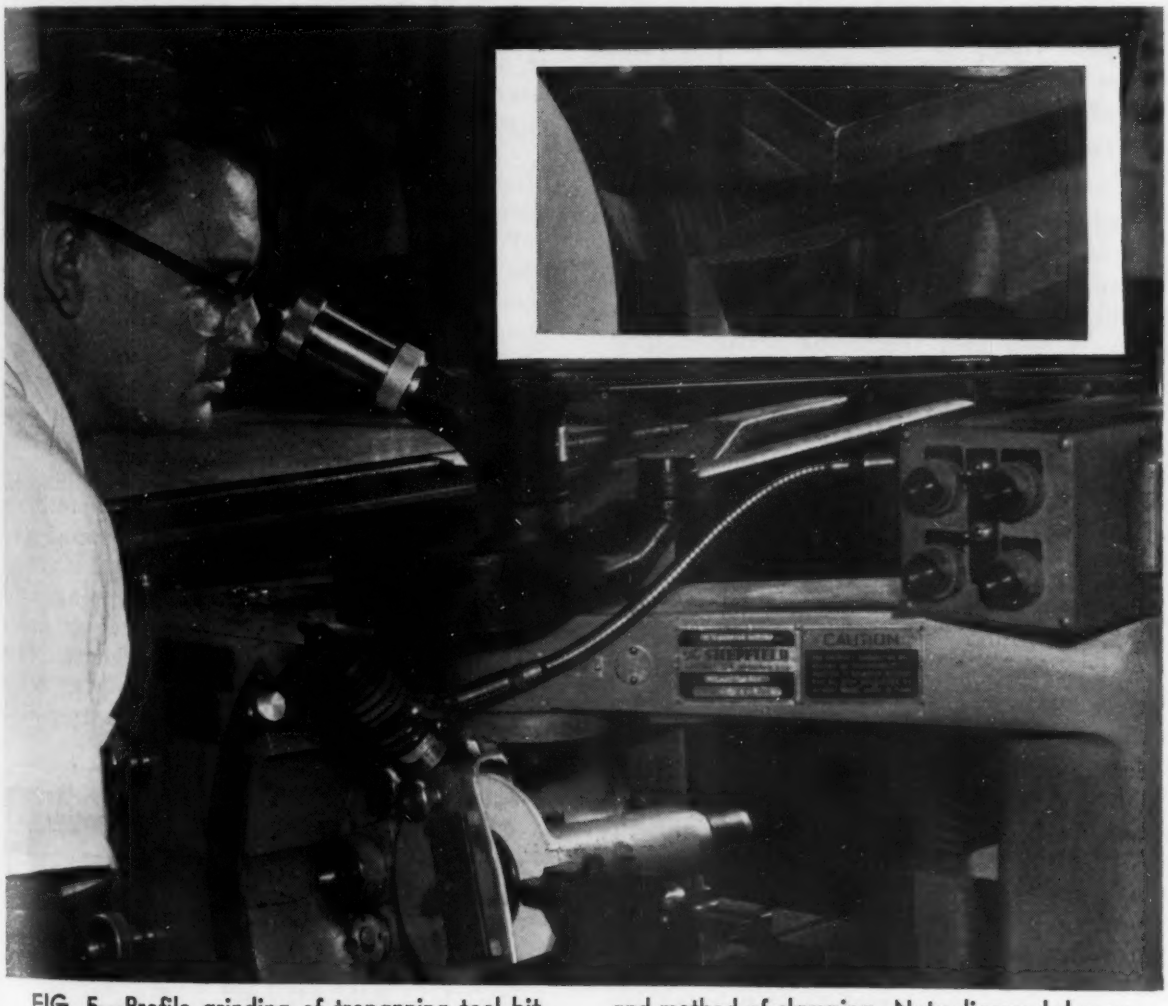


FIG. 5—Profile grinding of trepanning tool bit. Bit, insert, is out of position to show serrations and method of clamping. Note diamond dresser in background.

*Electrical changes—*

# How Heat Treatment Affects Properties of Cold Worked 18-8 WIRE

**By Samuel Storcheim**
Senior Metallurgical Engineer
Atomic Energy Div.
Sylvania Electric Products, Inc.
Bayside, L. I., N. Y.

◆ Temperatures up to 1100°F have no affect on magnetic properties of 18-8 cold drawn wire . . . Between 1100°F to 1400°F there is a change from magnetic to non-magnetic properties . . . Tensile strength and electrical resistance drop as temperature rises.

◆ HEAT TREATING changes magnetic, mechanical and electrical properties of cold worked 18-8 wire. Tests on cold worked 18-8 stainless wire with a hysteresis loop tester after various heat treatments indicated little change in remanence or coercive force at temperature to approximately 1100°F. At about 1000°F stress relief effect was noted in the opening of the curl diameter of the wire. A sudden and large increase in remanence (Br) with relatively no change in coercive force (Hc) was observed for severely cold worked wire at 1150°F. At temperatures above 1150°F the Br dropped and the Hc rose until a non-magnetic condition was reached. At this temperature the curl diameter was usually opened completely.

Test material consisted of stainless wires 0.004 in. in diam of various commercial chemical analyses cold drawn to a permanently magnetic condition. They were then strand annealed in cracked ammonia at various temperatures and for different lengths of time.

After heat treatment, six strands of wire representing six different reaction conditions were tested for remanence and coercive force. This was done in a hysteresis loop tester. In some instances, routine tensile and electrical resistivity tests were conducted at the same time.

Wire of Analysis 1 in Table I received a 70 pct reduction in area and was then annealed at a series of increasing temperatures and magnetically tested. The results show the lack of response at low heat, Table II, Figs. 1 and 2. Very little change in Hc and Br were noted after heating at temperatures of 1100°F or lower.

To decide whether the lack of response to low annealing temperature was real, it was thought advisable to keep a wire at a low annealing temperature for a longer time. Wires of the kind used in the previous experiment were held at 600°F for two hours. No change in Hc-Br was found when testing these specimens.

The results found indicated that temperatures up to about 1100°F had no effect upon the magnetic properties of the wire. Temperatures at approximately 1100°F, have a very marked influence upon Br and Hc; Br dropping and the Hc rising with increased temperature until the wire eventually becomes non-magnetic. The change in magnetic values is associated with the conversion of the magnetic martensitic

TABLE I
**CHEMICAL ANALYSES OF 18/8 STEELS**

| No. | Ni | Cr | Mn | Si | C | Mo, Approx. | Fe |
|---|---|---|---|---|---|---|---|
| 1 | 9.02 | 17.78 | 0.48 | 0.38 | 0.095 | .09 | Balance |
| 2 | 8.75 | 18.08 | 0.54 | 0.38 | 0.08 | .10 | Balance |
| 3 | 8.70 | 17.79 | 0.52 | 0.38 | 0.09 | .10 | Balance |
| 4 | 9.41 | 18.39 | 0.91 | 0.59 | 0.08 | Not found | Balance |

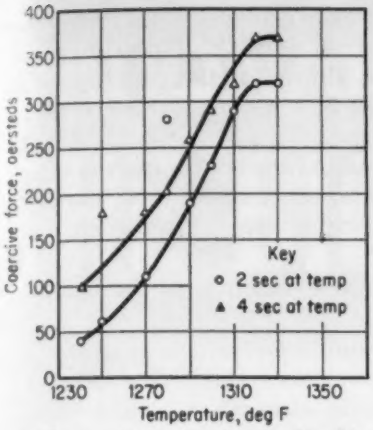



FIG. 1—Coercive force of cold worked wire shown above as a function of temperature for different times at temperature.

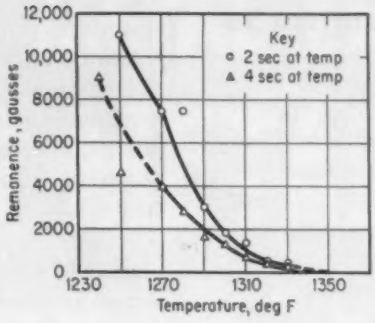



FIG. 2—Remanence of cold worked wire shown in above chart as a function of temperature for times at temperature.

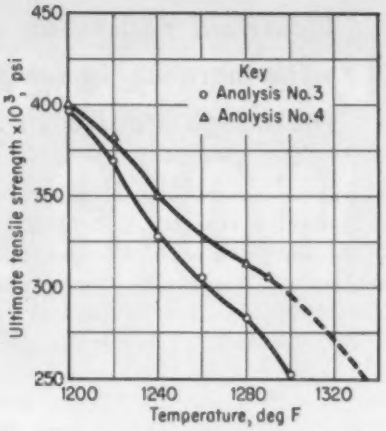



FIG. 3 — Ultimate tensile strength of two analyses as a function of temperature. Gradual decrease is shown.

TABLE II

**COERCIVE FORCE AND REMANENCE**
**Of Wire Reduced 70 Pct as a Function of Temperature**

| Temp., °F | Hc, oersteds | Br, gausses |
|---|---|---|
| 1000 | 190 | 2,290 |
| 1100 | 190 | 2,260 |
| 1200 | 270 | 1,240 |
| 1300 | 400 | 300 |
| 1400 | Non magnetic | ..... |
| 1500 | Non magnetic | ..... |

TABLE III

**COERCIVE FORCE AND REMANENCE**
**As a Function of Time and Temperature**

| | 2 sec. at Temperature | | 4 sec. at Temperature | |
|---|---|---|---|---|
| Temp., °F | Hc, oersteds | Br, gausses | Hc, oersteds | Br, gausses |
| 1240 | 40 | ..... | 100 | 9,000 |
| 1250 | 60 | 11,000 | 180 | 4,600 |
| 1270 | 110 | 7,500 | 180 | 4,000 |
| 1280 | 280 | 7,500 | 200 | 2,800 |
| 1290 | 190 | 3,000 | 260 | 1,700 |
| 1300 | 230 | 1,800 | 290 | 1,300 |
| 1310 | 290 | 1,280 | 320 | 660 |
| 1320 | 320 | 410 | 370 | 400 |
| 1330 | 320 | 400 | 370 | 280 |

TABLE IV

**REMANENCE CHANGE AT 1150° F**

| Before Heat Treating | | | After Heat Treating at (1150°F) | | |
|---|---|---|---|---|---|
| No. | Hc, oersteds | Br, gausses | No. | Hc, oersteds | Br, gausses |
| 1 | 80 | 7,500 | 1 | 90 | 8,950 |
| 2 | 30 | 5,500 | 2 | 30 | 10,000 |
| 3 | 55 | 7,250 | 3 | 45 | 10,300 |

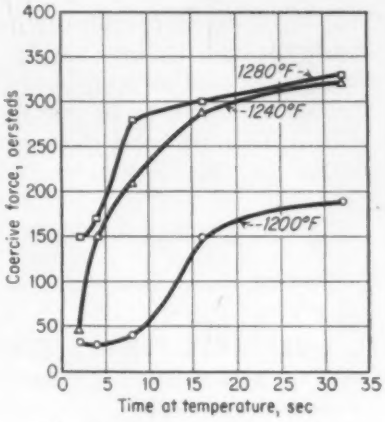



FIG. 4—Coercive force shown as a function of time at various isotherms.

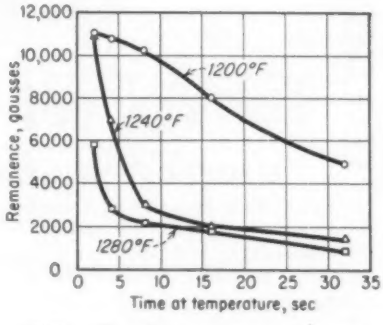



FIG. 5 — Remanence shown above as a function of time at various isotherms.

phase to the non-magnetic phase, austenite. The complete conversion of martensite at 1400°F to austenite caused the wire to become fully non-magnetic.

The sudden and large changes in Hc-Br values between 1200°F and 1300°F were the subject of a more detailed study. Wire of analysis 2 reduced 98 pct has more martensite to convert than wire reduced 70 pct. The tests carried out for both two and four seconds through the hot zone of the furnace repeatedly showed the same results. As the annealing temperature increased, the Hc went up and the Br diminished until the wire eventually became non-magnetic, see Table III.

Hc-Br values were plotted against the annealing temperature, Figs. 1 and 2, and fairly smooth, curved lines were obtained. Note that

***Electrical resistance went down with increase in temperature in the range studied . . .***

the curves for coercive force are displaced from each other a reasonably constant distance and do not approach each other as the heat treating temperature rises. The wires became less and less magnetic as the temperature of heat treatment is increased. Extrapolation indicates the wires would cease being magnetic if a temperature in excess of 1350°F was used. The coercive force would drop to zero from the high values exhibited. In addition, both remanence curves approach each other as the temperature increases. The rate of decline in remanence is less for the wire in the furnace for four seconds than the wire in the furnace for two seconds.

It was observed, specifically for 98 pct reductions with high Br and low Hc values that a very sudden and striking increase in Br was obtained with little or no change in Hc at about 1150°F. This occurred just before the large changes in Hc started to take place, see Table IV.

This result can probably be explained as a sudden precipitation of carbon from the martensite. The carbon comes out possibly as a chrome carbide, thus depleting the magnetic phase of chrome and leaving behind domains of iron-nickel alloys. This accounts for greater remanence values. As the temperature is raised further, the martensite transforms to austenite which in turn starts taking the carbide back into solution.

Ultimate tensile strength tests for analyses 3 and 4 showed, see Fig. 3, a gradual decrease as annealing temperatures increased as shown in Table V. This is due to the formation of the low tensile strength austenite in the matrix of relatively high tensile strength martensite, and to the stress relieving of strained areas near and within the martensitic zones. The more austenite introduced, the lower the tensile strength until only austenite is present. with its comparatively lower tensile strength.

An interesting observation has been made concerning stress relief. Stainless steel wire after it is drawn through dies usually acquires a curl regardless of the care the wire-drawer uses. The diameter of the curl for some degree can be varied by manipulation of the dies.

When such wire emerges from the heat treating furnace at the temperature of magnetic change, it is usually perfectly straight. This may be due to the change in volume caused when the greater volume of martensite goes over to the lesser volume of austenite.

TABLE V

**ULTIMATE TENSILE STRENGTH**

**As a Function of Temperature**

| Temp., °F | Ultimate Tensile Strength, psi | |
|---|---|---|
| | Analysis No. 3 | Analysis No. 4 |
| 1200 | 397,000 | 400,000 |
| 1220 | 370,000 | 382,000 |
| 1240 | 328,000 | 350,000 |
| 1260 | 306,000 | |
| 1280 | 283,000 | 313,000 |
| 1290 | | 306,000 |
| 1300 | 252,000 | |

TABLE VI

**ELECTRICAL RESISTANCE**

**As a Function of Temperature**

| Temperature, °F | Resistivity, Ohm—cm ft. |
|---|---|
| Room Temperature | 650 |
| 1220 | 585 |
| 1280 | 490 |

TABLE VII

**EFFECT OF TIME AT TEMPERATURE**

**On Coersive Force and Remanence**

| Time at Temp., Secs. | Held at 1200°F | | Held at 1240°F | | Held at 1280°F | |
|---|---|---|---|---|---|---|
| | Hc, oersteds | Br, gausses | Hc, oersteds | Br, gausses | Hc, oersteds | Br, gausses |
| 2 | 35 | 11,000 | 45 | 11,000 | 150 | 5,800 |
| 4 | 30 | 10,800 | 150 | 7,000 | 170 | 2,800 |
| 8 | 40 | 10,200 | 210 | 3,000 | 280 | 2,200 |
| 16 | 150 | 8,000 | 290 | 2,000 | 300 | 1,800 |
| 32 | 190 | 5,000 | 320 | 1,500 | 380 | 950 |

### Wire curl diameter "opened"

The diameter of the wire could be "opened" but not eliminated without changing the Hc-Br values by sending the wire through the furnace at 1000°F. This indicated that the above change also involved a stress relief operation.

Electrical resistance went down with increase in temperature in the range investigated. This is shown in Table VI for wire reduced by 98 pct. The highly stressed martensite offers more resistance to the passage of an electric current than does the stress relieved mixture of martensite and austenite. Minimum resistivity is obtained when maximum austenite is present in the matrix.

The effect of annealing time was found by determining the Hc-Br on cold worked wires representing analysis No. 2 of Table I held at three temperatures, 1200°F, 1240°F and 1280°F for varying lengths of time. The data obtained, Table VII, Figs. 4 and 5, are indicative of the changes that had taken place. With increased time, Hc went up and Br down in the range of heat treating temperatures used.


REFERENCE

"Permanent Magnetic Properties in 18/8 Obtained by Cold Working," Iron Age, Feb. 12, 1953.



ACKNOWLEDGMENT

The author thanks the Wilbur B. Driver Co. for its kind permission to publish this article.

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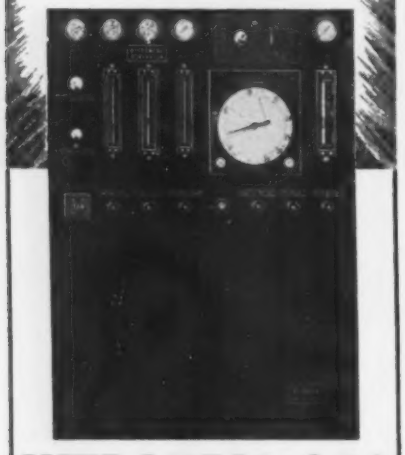

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# Technical Briefs



## METHODS:

**Industrial stethoscope speeds burnishing, cuts scrap loss.**

An unusual industrial stethoscope that speeds up burnishing operations while reducing scrap loss and operator fatigue, has been successfully introduced in an aeronautical manufacturing plant here.

Conceived by Ted Minor, a methods engineer in Minneapolis-Honeywell Regulator Co.'s aeronautical division, the new system utilizes the fact that the volume of sound in such finishing operations is in direct proportion to the amount of metal being removed.

### Wired for Sound

By using a microphone, amplifier and earphones (or speaker) sound from the burnishing wheel is amplified to guide the operator in holding extremely close tolerances. Tied in with the operation of the stethoscope is an electronic comparator to check dimensions. This instrument is accurate to 5 millionths of an inch, which is 500 times as small as a human hair.

The new system, installed on two burnishing machines, has reduced scrap loss by minimizing "over shooting" of the tolerance point. Minor explains that it takes only one-fiftieth the thickness of a human hair to mean the difference between scrap and a finished product.

Operators formerly were prone to lean over their machines to "hear" how much metal was being removed by the burnishing wheel. The new system not only obsoletes this practice but reduces fatigue since the operator can monitor the operation while sitting in a normal, comfortable position.

OPERATORS CAN "HEAR" how much metal is being taken off in this burnishing operation at Minneapolis-Honeywell's plant. Elimination of overshooting in taking off metal has cut scrap losses.

**IF YOU WANT MORE DATA**

***You may secure additional information on any item briefed in this section by using the reply card on page 69. Just indicate the page on which it appears. Be sure to note exactly the information wanted.***

## DUST FREE AIR:

**Cleaner foundry operation stems from dust control equipment.**

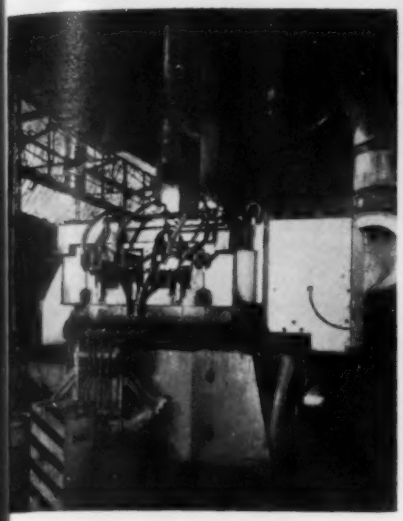
Clean, dust-free air inside the foundry is being achieved by Chicago Steel Foundry Co., Chicago, through use of fiber glass, bag-type suppressor installation, one of the first of this type to be used in the midwest area with electric furnace operation.

Removing impurities from air has long been a major foundry goal. Immediate benefit at Chicago Steel is improved working conditions; a longer range view will include the obvious stimulus to production and a more stable working force.

### Charging, Melting, Tapping

Both the suppressor and the Hydro-Arc electric furnace at Chicago Steel are products of Whiting Corp., Harvey, Ill. This suppressor operates during all three stages of charging, melting and tapping.

Gases are drawn from the furnace area through ducts to the bag house located outside the foundry. Here the fiber glass bags utilize the vacuum cleaner principle to



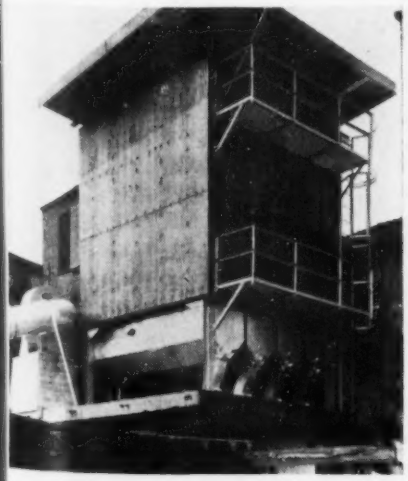
DUCT FROM FURNACE draws off smoke, dust and fumes. These are passed to bag-house suppressor unit outside of foundry.

remove smoke, dust and fumes.

The fiber glass construction of the bags enables them to withstand temperatures up to 500F without loss of efficiency. Water cooling is not needed. Shakeout of the bags is done manually in this installation.

### Removed Via Ducts

Auxiliary equipment is installed within the foundry at the furnace to remove the normal stack effluent. The effluent is then passed through ducts to the bag house outside the foundry, as shown below.



BAG-HOUSE of dust and fume suppressor at Chicago Steel Foundry Co., Chicago, uses fiber glass bags to clean smoke, dust and fumes from electric furnace.

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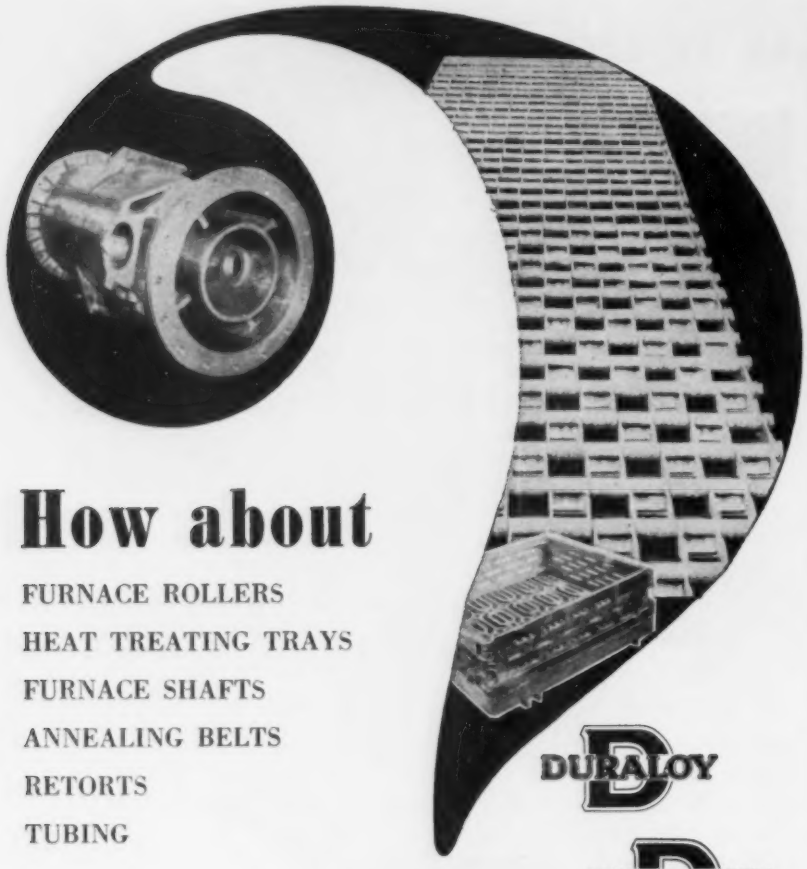

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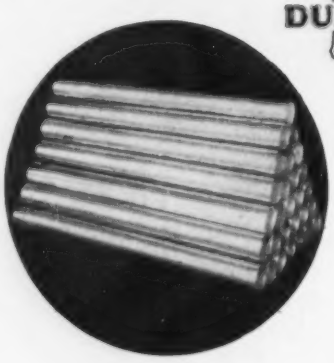

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## —Technical Briefs—

### CAST BAR:

**Ductile iron bar stock offered as new engineering material.**

Ductile iron bar stock in lengths to 12 in. and in diameters from 1¼ to 6 in. is now being produced by Howard Foundry Co. of Chicago.

Cast iron bar stock has been available for some time, but the development of ductile iron bar stock posed a problem, the company reports. Due to the nature of ductile iron, center-line shrinkage, was difficult to overcome.

#### As-cast Properties High

Howard recently solved this problem and is producing bars that are sound from one end to the other and will pass X-ray inspection for density.

As-cast average properties of the ductile iron bars are 100,000 psi tensile strength, 65,000 psi yield, 3½-4½ pct elongation and 245 Bhn. Bars can be heat treated for greater elongation and hardness.

#### Good Machining Properties

Ductile iron machines very well and has good anti-friction qualities due to graphite still in matrix after innoculation of magnesium. The material compares favorably with steel, yet has the best properties of cast iron.

Bars can be used in maintenance, production or specialty work in such applications as pins, bushings, shafts, bearings and valve guides.

#### Used in Oil Pump Bodies

Ductile iron bars already are being used by aircraft plants to provide a satisfactory material with as-cast elongation. Intricate, thin oil pump bodies and covers for use in jet engines are being machined out of the bars.

### Design Improved Drilling Rig

A new jet drilling rig put into operation at Ventura, Calif., by Shell Oil Co. promises to reduce substantially the time and cost of drilling oil and gas wells. Large volumes of mud, under high pressure, are forced down through the drill pipe, through the jet bit and back to the surface.

*Turn to Page 124*

# *Saves Time... Cuts Costs*

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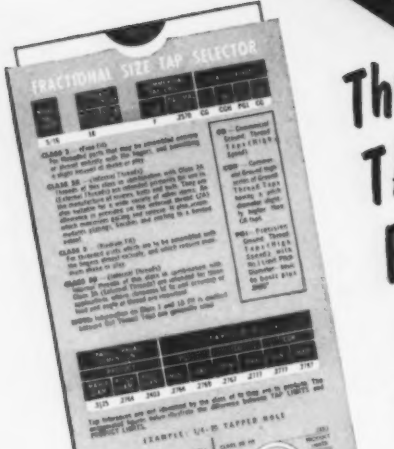


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## TRUCK TESTING:

**Test power consumption on your electrical industrial trucks.**

Well-designed, properly-maintained electric-powered industrial trucks should operate at between 100 to 120 watts per ton per mile per hour, according to Harold Milz, chief engineer, Mercury Mfg. Co., Chicago.

If your trucks are consuming power at this rate, they are running efficiently. However, if more than 120 watts are required, they are probably consuming more power than necessary and wasting both power and money and are on their way to breaking down.

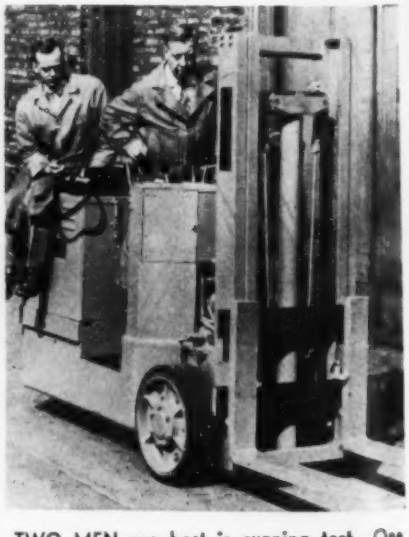
### Run Your Own Test

One way to determine the efficiency of your electric-powered handling equipment is to conduct an efficiency test. A few test readings and a few simple calculations will enable you to evaluate the operation of trucks.

The data will be useful in two ways: (1) To tell whether or not trucks are performing economically. (2) To help determine when trucks need minor adjustments or major overhauls.

Equipment needed includes:

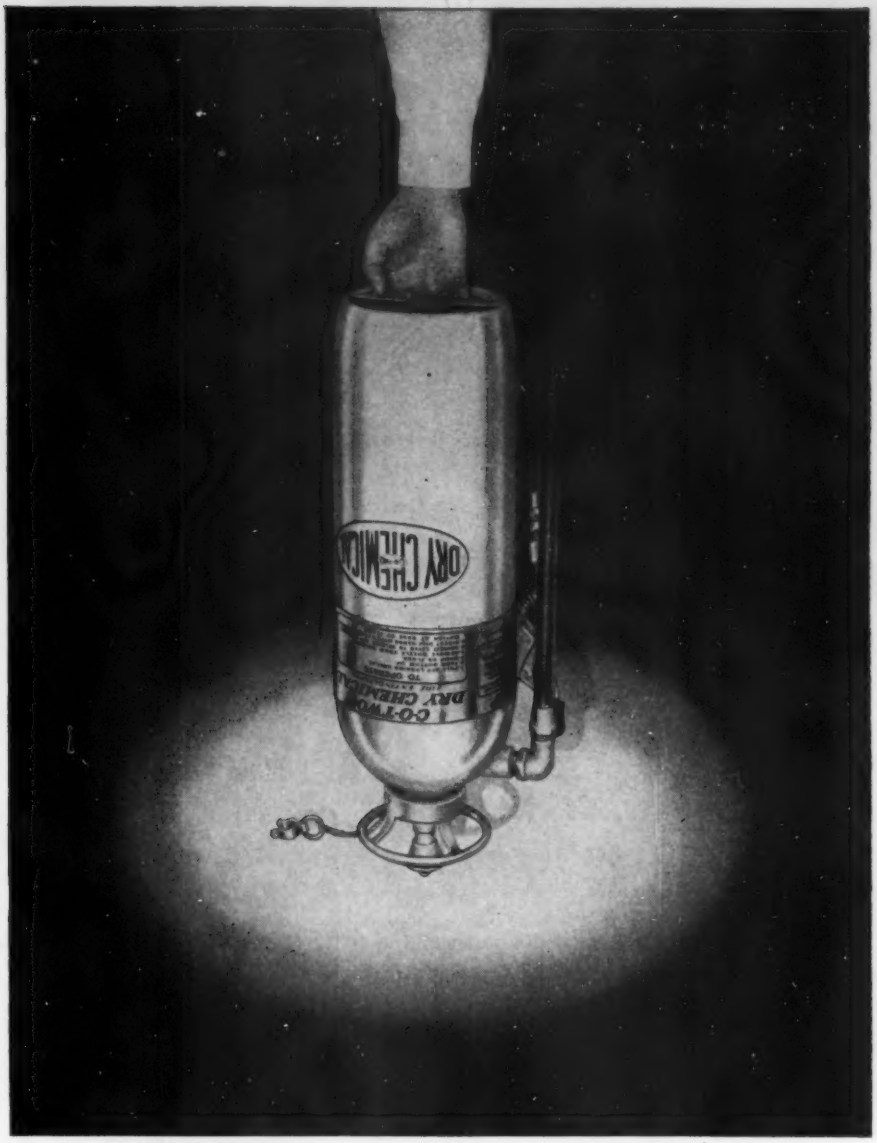
1. A 0 to 500-amp ammeter (with several shunts for lower scale readings).
2. A 0 to 100-v voltmeter.



TWO MEN are best in running test. One drives the truck over a measured course, the other records stop watch and current and voltage readings.

*Turn to Page 126*

# Bump that assures positive results




***When fire strikes, seconds count . . . your fire extinguishers must be the right type and function properly from the very start . . . failure means serious losses.***

The growing popularity of the highly effective powdered dry chemical fire extinguishing agent may be hampered by a drawback . . . settling or packing can occur after a lapse of time. However, with C-O-TWO Dry Chemical Type Fire Extinguishers there's no chance of this happening.

The exclusive inverting and bumping design of C-O-TWO Dry Chemical Type Fire Extinguishers provides mechanical breakage of the dry chemical by shifting its position in the cylinder. This outstanding mechanical breakage, plus continuous inert gas pressured agitation or fluffing of the skillfully blended free flowing dry chemical, guarantee lasting, foolproof fire protection.

No other brand on the market today gives you this extra margin for positive results. Inverting and bumping is only one of many unique design advantages that make C-O-TWO Dry Chemical Type Fire Extinguishers your best buy for killing flammable liquid and electrical fires, as well as surface fires involving ordinary combustible materials.

With C-O-TWO Dry Chemical Type Fire Extinguishers the heat-shielding dry chemical is a non-conducting, non-abrasive, non-toxic, finely pulverized powder compound . . . blankets fire instantly. Sizes range all the way from 4 to 150 pounds capacity . . . all fully approved by the Underwriters' Laboratories, Inc., Factory Mutual Laboratories and Government Bureaus.

Act now for complete free information on these top quality, sure-acting fire extinguishers. Remember fire doesn't wait . . . get the facts today!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

**C-O-TWO FIRE EQUIPMENT COMPANY**
NEWARK 1 • NEW JERSEY

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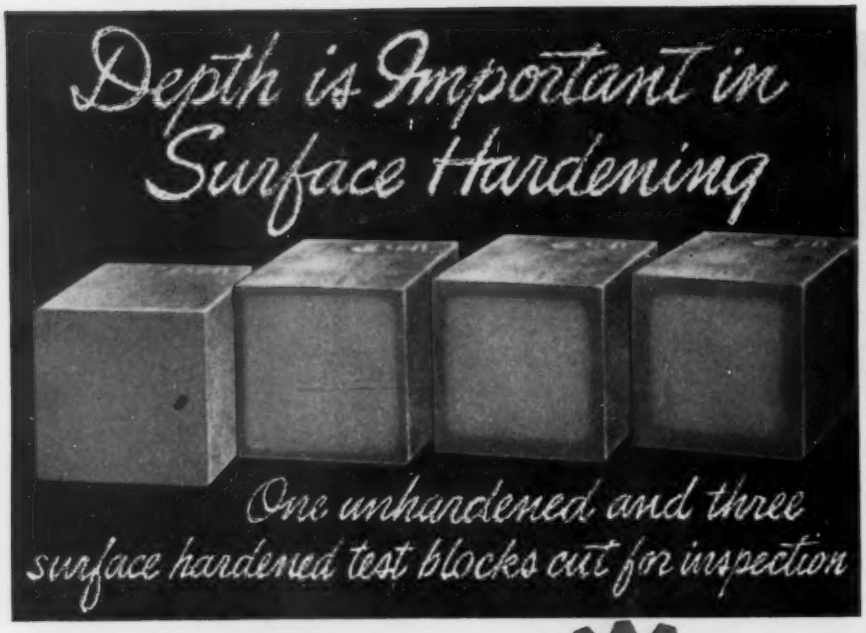
*Sales and Service in the Principal Cities of United States and Canada*

AFFILIATED WITH PYRENE MANUFACTURING COMPANY




**PITTSBURGH purple**

*—Your Guarantee of Longer Life*

GUARANTEED PITTSBURGH ARMORED GEARS

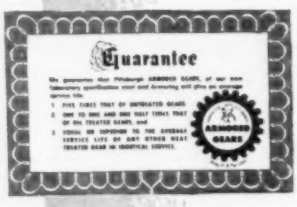
Trademark Registered U. S. Patent Office

The exact depth of surface hardening is one of the most important factors in the exclusive PITTSBURGH **Armored Gear** formula. The metal, machining, and overall heat-treating are very important in the long service life of PITTSBURGH GEARS, and with surface hardening to the correct depth for the use the gears will be put to, you can expect unusually long service.

PITTSBURGH **Armored Gears** are guaranteed to give five times the life of untreated gears, one to one and one-half the life of oil-treated gears, and equal or longer life than any other gear in identical service. **Armored Gears** are quickly identified by their distinctive corrosion preventive coating of "**Pittsburgh Purple.**"

Let us quote on one of your requirements. Then put the PITTSBURGH **Armored Gear** to work. See how much longer it lasts—and how much less your service cost is. Send your specifications today.

SPUR
MITRE
HELICAL
HERRINGBONE
WORM GEARS
REDUCERS
CRANE WHEELS




**PITTSBURGH GEAR COMPANY**

27th & Smallman Streets
Pittsburgh 22, Pa.
Phone: ATlantic 1-9950

subsidiary of BRAD FOOTE GEAR WORKS, INC. • CICERO 50, ILLINOIS


## —Technical Briefs—

3. A stopwatch graduated to tenths of a second.

4. A platform scale large enough to weigh the truck and its load.

5. A smooth, level concrete floor approximately 200 ft long.

Test readings should be recorded on a suitable data sheet. Facts essential to the test that should be recorded on this sheet are:

1. Truck weights, both loaded and unloaded (drive-wheel loads, trail-wheel loads, and total loads).

2. Travel time required to traverse a measured course in forward and reverse directions, both light and loaded.

3. Time required for forks and telescopic mast to travel a measured distance, both light and loaded.

4. Left and right turning radii.

5. Forward and backward tilt angles.

Other facts that it is advisable to record are: date of test, number of test, test personnel, type of battery, and corrective steps recommended and taken.

### How to Run Test

The test can be run more easily and with greater accuracy when one man drives and one man records test data. A step-by-step outline of how the test should be run follows:

**LIFT & FORK TRUCK TEST DATA**

CUSTOMER PPG Manufacturing Company ADDRESS Philadelphia, Pa.
TYPE OF TRUCK 2000 lb. Fork Truck MODEL NO. A-2306-48
SERIAL NO. 27611 LOAD 2000-45,000# LOAD MOMENT ARM 24"
BATTERY 36-15 TCM Tudor 253, 45 12-1/2 OPEN CIRCUIT VOLTAGE 31
DRIVE MOTOR #8 TYPE ET 19 SERIAL NO. 179693
HOIST MOTOR #8 TYPE ET 118 SERIAL NO. 190693
DRIVE WHEEL TIRES Goodyear TIRE SIZE 12" x 5"
TRAIL WHEEL TIRES S. S. TIRE SIZE 10 x 5
CONTROLLER Controtor MODEL NUMBER 3 speed
DATE OF TEST 5/8/53 TESTED BY DF

TRAVEL PERFORMANCE LIGHT

| DIRECTION OF TRAVEL | AMPS | VOLTS | SEC-60' | FPM | MPH |
|---|---|---|---|---|---|
| OPERATOR LEADING | 33 | 30 | 11.0 | 491 | 5.66 |
| LOAD LEADING | 33 | 30 | 11.0 | 491 | 5.66 |
| OPERATOR LEADING | | | | | |
| LOAD LEADING | | | | | |

WATTS PER TON PER MILE PER HOUR = 390

TRAVEL PERFORMANCE LOADED

| DIRECTION OF TRAVEL | AMPS | VOLTS | SEC-60' | FPM | MPH |
|---|---|---|---|---|---|
| OPERATOR LEADING | 60 | 298 | 13.6 | 660 | 5.80 |
| LOAD LEADING | 63 | 298 | 13.2 | 633 | 5.49 |
| OPERATOR LEADING | | | | | |
| LOAD LEADING | | | | | |

WATTS PER TON PER MILE PER HOUR = 97

HOIST PERFORMANCE

| | LIGHT MAIN TEL. | LOADED MAIN TEL. | | LOWERING SPEED | WEIGHT LOADED | WEIGHT LIGHT |
|---|---|---|---|---|---|---|
| AMPS | 80 70 | 130 135 | | | DRIVE | DRIVE 1360 |
| VOLTS | 30 298 | 29 294 | LIGHT | LOADED | TRAIL | TRAIL 1005 |
| TIME S | 7.0 5.0 | 4.6 4.4 | 15.0 | 15.2 | TOTAL 7500 | TOTAL 9800 |
| DISTANCE | 2" 2" | 2" 2" | 119" | 119" | RIGHT TURNING RADIUS 238" | |
| F.P.M. | 42.0 60.0 | 25 35.6 | 35.0 | | LEFT TURNING RADIUS 0" | |
| PRESSURE | | | | | TILT FORWARD 3 DEGREES | |
| | | | | | TILT REVERSE 30 DEGREES | |

OVERALL LENGTH 70" OVERALL WIDTH 36" COLLAPSED HEIGHT 57"
WHEEL BASE 36" PLATFORM SIZE FORK SIZE 12 x 5 x 36 1/2
MINIMUM ELEVATION 3.5" MAXIMUM ELEVATION 109" TEST: 1 2 3 4
REMARKS Watts show entire operation.

TEST SHEET developed by engineering department of Mercury Mfg. Co. for running truck tests.

*Turn to Page 128*

# Talking shop-

If college degrees were awarded to industrial plants as well as to students, the big Wetherill machinery plant at Sun Ship would certainly be a candidate for an "M.M."—Master of Metals.

Cylinder assembly, shown above, for a massive 2750-ton extrusion press is a sample of the plant's qualification for the title. But—fine example of power and precision that it is—it is just one example of many that can be seen year in and year out in the massive machinery-building plant that has been doing special work for a great variety of industries through the years.

Giant engine lathes with 132-inch swing up to 50 feet in length, small turret lathes, planers up to 14 feet wide, and a special crankshaft machine for shafts of largest sizes are among the modern machine tools which give Sun Ship's plant its versatility and speed in construction. Coupled with the skill and experience of the staff, the facilities of Sun Ship have set a notable record of service to many varied industries in building special machinery . . . and thus helping build a greater America.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE SINCE 1916 CHESTER, PA.

25 BROADWAY • NEW YORK CITY

## Truck Testing:

Continued

Measure off an 88-ft length on the 200-ft stretch of concrete, make sure there is at least a 50-ft approach at each end.

Weigh truck without load.

Record drive-end weight, trail-end weight, and total weight values.

Connect voltmeter across battery terminals and put ammeter in series with the main line by connecting it between the battery and controller.

Run truck in a forward direction (forks leading toward the test course).

Start your stop-watch as the truck passes over the zero mark on the course.

Record ammeter and voltmeter readings in score sheet columns labeled "travel performance light."

Stop watch as truck passes the 88-ft mark.

Bring truck to a stop near end of the 200-ft distance.

Record elapsed time for the 88-ft forward traverse.

Start truck in a reverse pass across floor (forks trailing), repeat the timing and meter-reading procedures specified above and make the appropriate recordings.

When conducting the first test on any given course it is a good plan to turn the truck end for end and repeat the above procedure so as to make sure that the course is level. Even a slight grade will result in much better performance in one direction than in the other.

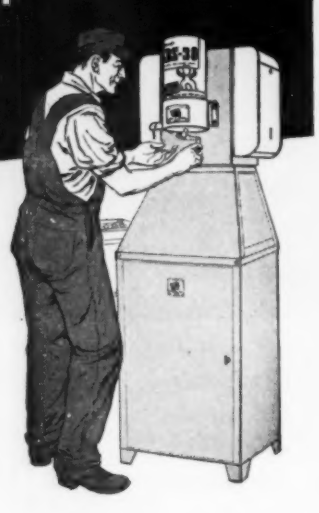
*(To be continued next week.)*


# NEW SBS WATERLESS WASHSTATION*

"brings the washroom to the worker"*

for only $52.50 per unit

(F.O.B. Saginaw, Mich. Towel Dispensers not included)



SBS Waterless Washstations are complete units for hand washing on the job. Because they dispense SBS-30 Waterless Skin Cleanser, these Washstations require no plumbing . . . SBS-30 is simply rubbed on the hands and wiped off along with all the soil.

**SBS Waterless Washstations—**

- **In Trouble Spots** — Avoids workers use of irritating, harmful solvents. Quickly and safely removes tars, greases, paints, varnishes and other hard-to-remove soils.
- **On the Production Line** — Cuts to a minimum costly interruptions for hand washing.
- **Actually Earn You Money** — By eliminating one unnecessary trip per day for hand washing by only 10 men, you can save up to $720 annually.

**Fill out and mail coupon below** for complete information about SBS Waterless Washstations and our 30-day no-risk money back trial offer.

**SUGAR BEET PRODUCTS CO. • Saginaw, Mich.**
**Chemical By-Products Division**

## MAIL TODAY - GET THE FACTS!

SUGAR BEET PRODUCTS CO., Dept. BA, SAGINAW, MICHIGAN

Sirs: Please send me full information about the new SBS Waterless Washstation and your 30 day no-risk money back trial offer.

NAME_____

TITLE_____

COMPANY_____

CITY_____ ZONE_____ STATE_____


## WELDING:

**Unusual bridge design is strong, economical, has form freedom.**

Freedom of form previously available only with concrete, has been achieved with steel materials in a welded steel bridge spanning the Rio Blanco River near Vera Cruz, Mexico.

By applying welding techniques, Mexican engineer, Camilo Piccone, has projected a span with slender arch ribs, free of cumbersome bracing. The structure is based on a new design conception by Thomas C. Kavanagh, Department of Civil Engineering of New York University's College of Engineering.

The 250-ft long, all-welded steel splayed-arch highway bridge accommodates three lanes of traffic. The arch ribs are inclined and joined at the center of the span.

BASKET HANDLE effect results from joining arches at center. In this welded steel bridge spanning the Rio Blanco River near Vera Cruz, Mexico. Unique design features helped cut construction costs.

## —Technical Briefs—

### MATERIALS:

**Vinyl bonded to metal sheet for added protection at low cost.**

A method of laminating vinyl plastic and sheet steel or aluminum which will make these metals colorful, decorative and rust and corrosion proof has been developed by Naugatuck Chemical Div., United States Rubber Co.

The process combines the structural strength of metal with the bright colors and exceptional corrosion resistance of vinyl plastic. More than 20 manufacturers of containers, business machines, chemicals, metals and allied products are now experimenting with the process.

#### Takes 180° Bend, Deep Draw

Some of the products which can be made from the plastic-metal laminate are decorative and weatherproof building siding, interior paneling, colorful lawn furniture, office and industrial machine housings, inexpensive corrosion resistant containers for chemicals, chemical piping and ducts, truck and trailer body panels, counter tops, shelving and lockers, and office furniture.

Called Marvinol - Metal Laminate, the material has a higher abrasion resistance than varnish, paint and baked enamel finishes. 180° bends and deep draws can be made without separating the vinyl from the metal. Cost of the laminate is higher than galvanized iron, and about one-third the cost of comparable gage stainless steel.

#### Use Regular Equipment

The laminate is made by rolling rigid or semi-rigid Marvinol vinyl sheet onto heated adhesive-coated metal sheets or strips. Rolling pressure is not high. After rolling, adhesion is effected in seconds under heat lamps or another suitable heat source. Secret of the process lies in a special adhesive, and proper preparation of the metal and the vinyl plastic compound.

The process can easily be adapted to high speed production for fabricating either continuous rolls or individual panels. To date


the A-B-C of M-S-T

A ALWAYS MAKES POSSIBLE
B BETTER PRODUCTS AT LOWER
C OST

Michigan Electric Resistance WELDED STEEL TUBING

A Quality Product

ROUND
⅜" to 4" O. D. 9 to 22 gauge
SQUARE-RECTANGULAR
½" to 2" 20 gauge, 1" to 2¾", 14, 16, 18 gauge
Carbon 1010 to 1025

Michigan Tubing has uniform strength, weight, ductility, I. D. and O. D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

Steering Jacket

Ready for the automobile assembly line is this vital volume produced tubular part of a major control unit.

Lower tube end is reduced to 2.260" O. D. x 10.525" long, held to close tolerance for assembly in line with body of base tube without machining. Upper end is reduced to 2.125" O. D. x 2.562" long, held on center line to extremely close decimal dimensions, with two perforations at tapered section. Michigan workmanship can always be depended upon to assure the exacting tolerances and part uniformity to keep customer assembly operations moving smoothly.

Michigan engineers will be pleased to work with you on an adaptation of welded steel tubing to help you make your product better at lower cost.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

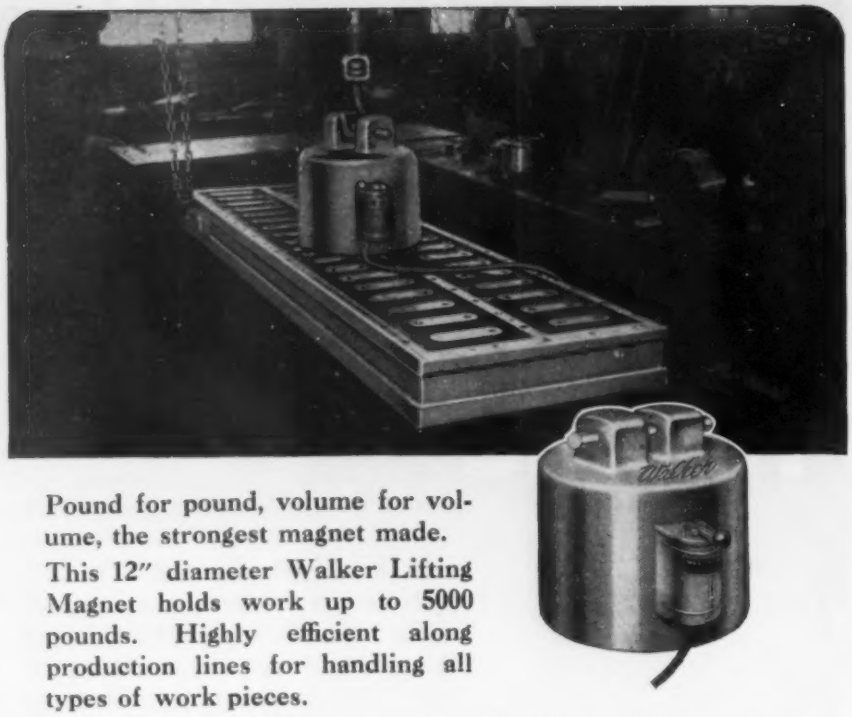
Plus Fabricating of our own tubing Michigan is interested ONLY IN THE FABRICATION OF Stainless steel, copper, brass and aluminum tubing.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING

Michigan STEEL TUBE PRODUCTS CO.

More than 35 Years in the Business
9450 BUFFALO STREET • DETROIT 12, MICHIGAN
FACTORIES: DETROIT, MICHIGAN—SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland Co., Dayton, Ohio—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—Streng, Carlisle and Hammond Co., Cleveland, Ohio—Globe Supply Co., Denver, Colorado—W. A. McMichaels Co., Upper Darby, Pa.—A. J. Fitzgibbons Co., Buffalo, N. Y.—Harry E. Clark & Co., Houston, Texas—J. B. Beaird Co., Inc., Shreveport, La.—C. I. Crais Co., Birmingham, Alabama.



Pound for pound, volume for volume, the strongest magnet made.

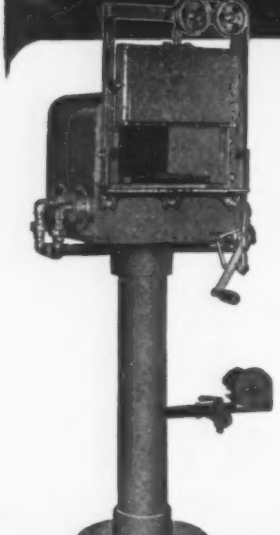
This 12″ diameter Walker Lifting Magnet holds work up to 5000 pounds. Highly efficient along production lines for handling all types of work pieces.

The Walker line includes contoured lifting magnets increasing the area of contact for special applications (for wire, pipe, etc.). Your lifting problems can be solved by Walker.

*Original Designers and Builders of Magnetic Chucks*

**O. S. Walker Co., Inc.** • Worcester 6, Mass.

# SAVE HOURS CUT COSTS



**TURN THE HEAT ON TOOLS AND DIES**
**With Quick-Acting JOHNSON Furnaces**

Save time, save gas... heat treat carbon and high speed steel tools and dies with JOHNSON No. 130A. Two sizes offer wide temperature range. Powerful burners provide fast, uniform heat with time saving speed. Temperatures are easily controlled with accuracy. The counter-balanced door opens upwards. Firebox 7" x 13" x 16½". Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower. Write for Complete Catalog. Johnson Gas Appliance Company, 598 E Avenue N.W., Cedar Rapids, Iowa.

**JOHNSON No. 130A Hi-Speed**
**For temperatures 1400° to 2350° F. $295.00**
**For temperatures 1800° to 2400° F. $325.00**
**F.O.B. Factory**
**Models also available in smaller firebox sizes.**

**JOHNSON**
Since 1901
**FURNACES FOR INDUSTRY**



cold-rolled steel, hot-rolled pickled steel and aluminum, from 18 to 34 gage, have been used to make the laminate. The vinyl films used have ranged from 0.002 to 0.02 in. thick.

Tests on the finished laminate indicate an adhesion in excess of 40 pounds per square inch of width. This high adhesion permits the laminate to be fabricated with all types of regular metal-forming equipment.

The laminate can be sheared, drilled or punched without chipping. Crimp rolls, 90° crimp bends, 180° bends and deep draws can all be made without damaging the coating. There are no special techniques required, and the only limitation in fabrication is that soldering, welding or brazing cannot be used without removing the coating for a short distance on either side of the seam.

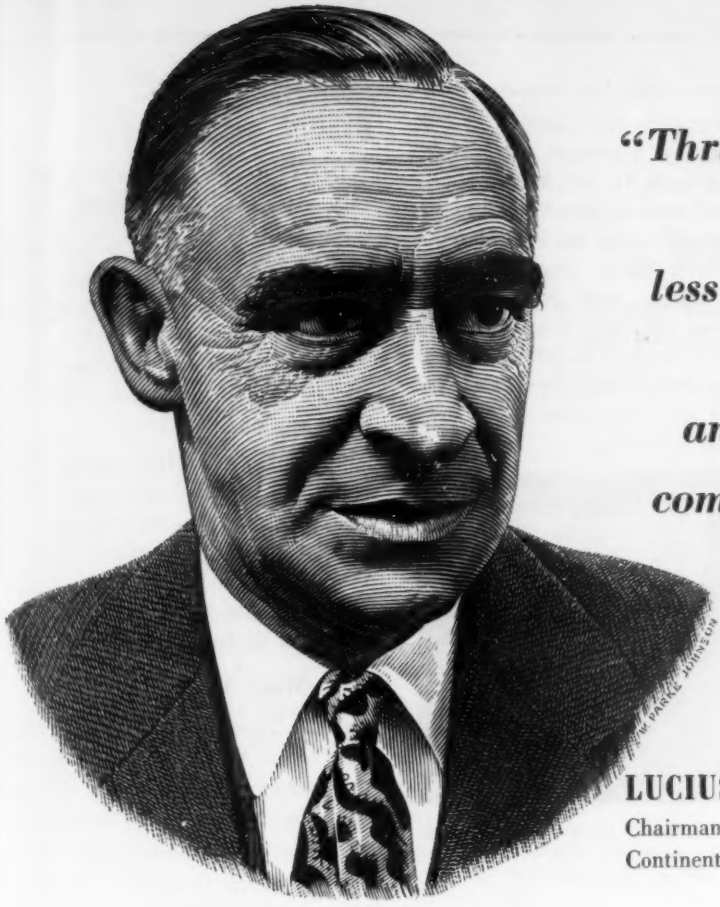
### Corrosion Resistant

Joints and exposed metal at cut edges can be protected. Pressure sensitive tape will give adequate protection against weather or chemical attack. Coatings of high molecular weight Marvinol vinyl resin in special solvents can also be applied to small areas exposed during fabrication.

In a series of corrosion tests, laminated panels have been left outdoors in an industrial atmosphere for two years without breakdown. Ducting made from the laminate has carried sulfuric and nitric acid fumes for a year without deterioration.

COLORED VINYL PLASTIC is bonded to aluminum and steel sheet in a process developed by Naugatuck Chemical Div., United States Rubber Co. Sheets can be deep drawn, bent 180° without breaking plastic or separating metal from plastic.

*Turn to Page 132*



***"Thrifty citizens . . . with Savings Bonds . . . less likely to be taken in by the false promises and ideologies of communist propagandists . . ."***

**LUCIUS D. CLAY**
Chairman of the Board
Continental Can Company

***"The regular purchase of Savings Bonds through the Payroll Savings Plan by millions of our citizens contributes importantly to the country's economic stability, the national defense effort, and to the financial independence of the individual. The thrifty, self-reliant citizen is one far less likely to be taken in by the false promises and ideologies which communist propagandists invariably direct to the 'have nots'."***

• To thousands of company executives, accountants, payroll department employees, PSP means Payroll Savings Plan, the simple payroll allotment operation through which employees make a monthly investment in U. S. Savings Bonds.

• To almost eight million employees of nearly 50,000 companies, PSP has a more intimate connotation. To them, PSP spells *Personal Security Plan.*

• Multiply the personal security of a single Payroll Saver by 43,000,000—the number of individuals who hold Savings Bonds having a cash value of $49.5 billion—and you have economic stability that is the keystone of our national defense.

• Thanks to the thousands of companies which offer their employees the Payroll Savings Plan, Bill Brown in the Machine Shop . . . Joe Green in the boiler room . . . and eight million more Browns and Greens can well turn a deaf ear to ". . . the false promises and ideologies . . ." of communist propagandists. Bill can see his new home taking shape in his growing stack of Savings Bonds . . . Joe sees each bond another step toward a college education for little Joe . . . and the "Old Timer," who eats his lunch with Bill, talks of "sitting down pretty soon" because his Bonds will make a nice addition to his Social Security.

• PSP holds still another benefit—this one for the employer. Payroll Savers are conscientious workers. Statistics show that absenteeism goes down, production improves and accidents decrease as payroll participation goes up.

• If employee participation in *your* Payroll Savings Plan is less than 50%—or if your company does not have a Payroll Savings Plan—get in touch with Savings Bond Division, U. S. Treasury Department, Washington Building, Washington, D. C. Learn how easy it is to help your country, your employees and your *company*—through the PSP.

*The United States Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.*

The Iron Age

## MATERIALS HANDLING:

**Rod, chain and spring simplify routing of drums on conveyor.**

A simple device for deflecting drums at conveyor transfer points gives Esso Standard Oil of Bayonne, New Jersey, 12 different routing possibilities at each intersection of its 144-line drum-handling system.

The device, one of several time and labor saving innovations in this completely conveyorized 3000-filled-drum-capacity storage system, is merely a section of roller chain secured at each end to a rod.

### Move Any Drum in 90 Seconds

By inserting the rods in holes provided at conveyor corners, the chain is stretched across the conveyor to deflect drums as desired. A spring at one end of the chain absorbs deflecting shocks.

Thus, 55-gal drums of oil coming from any one of four directions on these reversible conveyor lines can be routed, by a simple repositioning of the rods, to any one of three other directions—a total of 12 routing possibilities at each conveyor.

The entire Esso drum-handling system—which can remove any drum from storage, regardless of where it is located, in 90 seconds—was engineered and installed by Lamson Corp., Syracuse.

TWO RODS LINKED by chain and spring, which absorbs shock, are switched as needed to deflect barrels from conveyor to conveyor.

## DESIGN:

**Use of Carbide for ratchet cuts downtime, saves on parts.**

Use of carbide in a ratchet recently permitted a substantial savings in equipment costs and eliminated much downtime for changing of machine components at Henry G. Thompson & Son's New Haven, Conn. plant.

Operators of the above plant, famous for the manufacture of quality profile band and hack saw blades, reported recently that the 1-in. diam, 10-pitch carbide ratchets outlast more than tool steel ratchets 60 to 1.

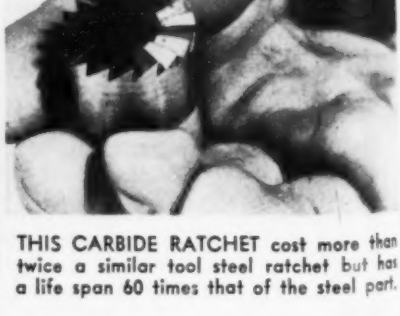
### Make Band Saw Stock

In the Thompson operation bandsaw stock is fed at a pre-set rate by means of a ratchet through carbide setting dies which produce the desired set in the saw teeth.

Steel stock is payed-off one reel in a vertical position with teeth up, through the setting dies, and onto a take-up reel. The feed ratchet—driven through a gear train—is synchronized with the setting die to assure the proper feed cycle for a correct saw tooth set.

Since the ratchet maintains continuous contact with the steel saw stock, any excessive wear on its teeth results in improper feed and scrapped saw stock.

Previously, oil-hardened steel ratchets were usable for feeding a maximum of 100,000 ft of stock. One carbide ratchet, at time of last report, had fed 6 million feet and was still in satisfactory operating condition.



THIS CARBIDE RATCHET cost more than twice a similar tool steel ratchet but has a life span 60 times that of the steel part.


NEW HEAVY-DUTY CART

WITH "3-POINT LANDING"

Here's just the cart you need for wheeling *coal, scrap, chips, turnings, borings* and similar heavy materials. All-steel, completely welded and reinforced. Made extra strong and rugged for heavy duty service. Dumps easily. Rests securely in any one of the three positions shown here. Available with roller bearings, if desired.

*Write for Circular No. 50.*

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

A 4825-⅛

# THE IRON AGE

• • •

- "Correction" period is already here for steel
- But it doesn't look as bad as some predicted
- Ingot rate advances one point to 95.0 Pct.

**As far as the steel industry** is concerned the coming "correction" period expected by economists is already here. This is because steel is a bellwether industry, often used to evaluate the general business future.

Since orders of steel consumers are in anticipation of future needs, they already reflect the manufacturing outlook. Judging by orders on the books and expected to come, fourth quarter steel business will be only a shade below third quarter.

**Steelmaking operations** in the third quarter averaged about 91.6 pct of rated capacity. During most of September a wildcat strike at the nation's fourth largest steel plant shaved the national rate by about 4 pct This deferred to the fourth quarter some production which had been planned for the third quarter.

Several months ago THE IRON AGE estimated steel production this year would be close to 112 million tons of ingots. This prediction took into account an expected decline in the second half, when it was estimated operations would average about 91 pct of capacity. Considering production deferred by strike, orders on the books, seasonal factors, and opinions of steel people themselves, this prediction still looks good.

**Operations this week** are scheduled at 95.0 pct of rated capacity, up one point from last week.

Inventory correction, now at its peak, has been going on for some time. It should be pretty well completed in the next 2 months. Such a correction occurs every time the steel market shifts from shortage to plenty.

**Prime example** of inventory correction is the auto industry, which holds almost unbelievably overloaded stocks—especially when measured against cut back production. Current inventories of 70 to 90 working days are about double normal.

Of course these inflated inventories are not entirely accidental, nor do they reflect bad guesses. Competitive drive to reach the customer first has resulted in a big production race. Result: It has seemed wiser to have too much scarce steel at some extra cost than to lose markets to competitors for lack of raw materials.

**To some extent** high inventories were also a holdover from NPA quotas which allotted steel a quarter at a time. Auto companies usually don't like to order much more than a month ahead if they are reasonably sure supplies will be available. Defense stretchouts or cutbacks also permitted production of some civilian steel orders quicker than would have otherwise been the case.

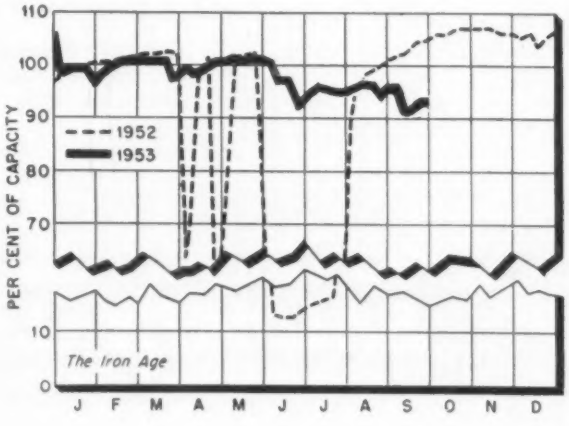
First reports on outlook for steel business early next year are optimistic. Order books of a few mills have been opened on one or more products with initial response from consumers better than had been expected.

**Scrap prices spiraled** downward for the ninth consecutive week. Some sources in the trade were near panic, as holders of distressed material threatened to cause the bottom to drop out of the market. THE IRON AGE Steel Scrap Composite fell $3.83 to $31.50.

## Steel Operating Rates

| | Week of Sept. 27 | Week of Sept. 20 | | Week of Sept. 27 | Week of Sept. 20 |
|---|---|---|---|---|---|
| Pittsburgh | 97.0 | 98.0* | Detroit | 98.0 | 99.0 |
| Chicago | 97.5 | 99.5 | Birmingham | 96.5 | 96.5 |
| Philadelphia | 96.0 | 96.0 | Wheeling | 98.0 | 101.0* |
| Valley | 94.0 | 95.0 | S. Ohio River | 82.5 | 80.0 |
| West | 99.5 | 99.5 | St. Louis | 96.0 | 89.0 |
| Cleveland | 94.0 | 94.0* | East | 87.5 | 86.5* |
| Buffalo | 106.5 | 91.0 | AGGREGATE | 95.0 | 94.0 |

Beginning Jan. 1, 1953, operations are based on annual capacity of 117,522,470 net tons.
* Revised.



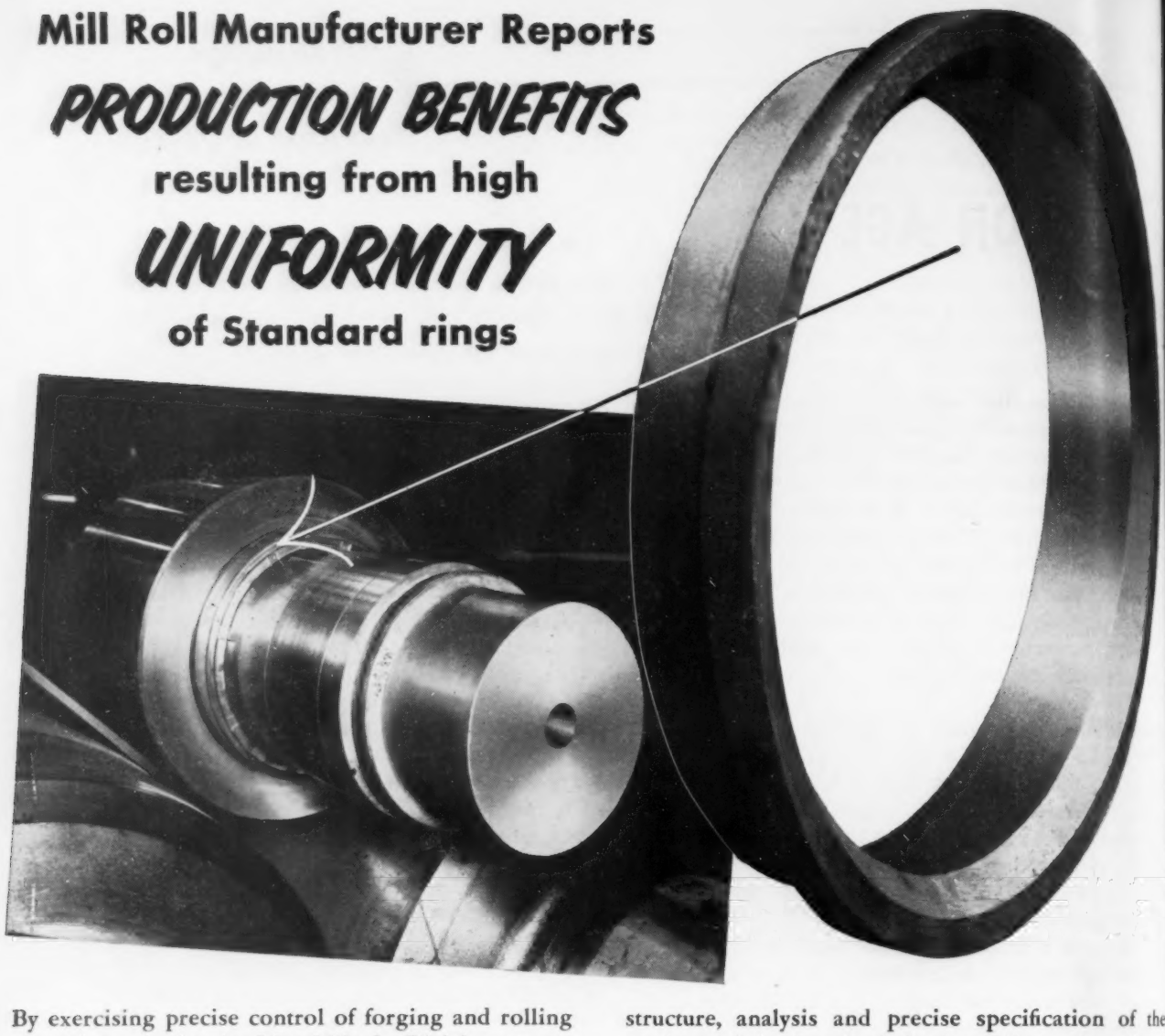
## Mill Roll Manufacturer Reports

# PRODUCTION BENEFITS

## resulting from high

# UNIFORMITY

## of Standard rings



By exercising precise control of forging and rolling operations, the Standard Steel Works Division assures greater *uniformity* in the structure and analysis of each ring.

Typical of performance records is a report from a large eastern manufacturer of mill rolls where Standard rings are employed as thrust rings (inside bearing raceways) on the finished roll. Not only do they report a 50% saving in cost, but they also find that the grain structure, analysis and precise specification of the steels used in Standard Steel weldless rings is of the highest caliber.

Thus another reason why you should standardize on Standard Steel rings and flanges to protect the quality of your products is the fact that you can be certain of Standard's uniformity in manufacture.

ONE OF SIX REASONS why you should always call Standard Steel for rings and flanges.

1. **Quality Steel**—through production of own steel by acid process.
2. **Uniformity**—assured by precise control of forging and rolling operations.
3. **Testing**—radiographic tests, tensile tests, hardness tests, ultrasonic probing of internal structure, etc.
4. **Capacity**—unsurpassed ability to produce weldless rings all the way up to 144" O.D.
5. **Experience**—produced by skilled workmen with 20 to 40 years experience.
6. **Fast Service**—a vital factor in the continuing growth of Standard Steel for over 150 years.

*For more information write Dept. 8516*

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General Offices: Philadelphia 42, Pa. • Offices in Principal Cities

# Markets at a Glance

**Republic Cuts Production** . . . Another cutback of alloy and stainless steel production at Republic Steel Corp.'s Canton and Massillon, Ohio, plants was made last week. Both plants are now operating at 66 pct of capacity. A few weeks before Republic reduced the operating rate to 75 pct. Manufacturers' inventory readjustments on alloy and stainless are blamed for forcing the production slowdown. Republic expects alloys to pick up in November.

**$250 Million Tool-up for B-52's** . . . Air Force plans to spend $250 million to tool up a second B-52 Stratofort production line at Wichita, Kan. B-52's are already being turned out by Boeing in Seattle. Air Force would not reveal how many planes will be produced at the Wichita plant alone, but combined output of both plants is expected to be enough for more than seven wings (heavy bomber wings usually have 30 planes). B-52's are capable of carrying hydrogen bombs.

**Locomotive Order Backlogs** . . . Locomotive order backlogs continue to decline. In August, Class I railroads put 156 new units in service which, after allowing for new orders during the month, reduced the number of new units still on order from 516 to 409.

**Industrial Supply Orders Slide** . . . New orders for industrial supplies and machinery are now being placed at a rate 40 pct above the base period of July 1948. Nevertheless orders have been dropping steadily since March. American Supply & Machinery Mfrs.' Assn. places its index for August at 140 compared with 188 for March. Level for August, 1952, was 129.

**Switch to Electric** . . . Jones & Laughlin Steel Corp. has completed electrification and rebuilding of a blooming mill at its Aliquippa, Pa., Works. The change from steam to electric drive, final phase of the modernization project, was completed after a 7-day, 14-hour shutdown.

**Ship More Heaters** . . . During the first 8 months of 1953, shipments of automatic gas water heaters totaled 1,471,200 units, an increase of 21.8 pct over the same period last year, reports Gas Appliance Mfrs. Assn. The association also estimates that shipments of domestic gas ranges during the same period amounted to 1,431,400 units, 4.4 pct more than in the first 8 months of 1952.

**Scrap in Biggest Dip Since '49** . . . Scrap market this week suffered its most severe one-week price drop in more than 4 years. THE IRON AGE Steel Scrap Composite plunged $3.83 to $31.50 in the steepest decline since April, 1949, when the price of No. 1 heavy melting plummeted $5.

**Machinery Price Rise Modest** . . . Recent bulletin issued by Machinery & Allied Products Institute states that between 1939 and July, 1953, the prices of all industrial products increased an average of 98 pct. Rise in machinery and equipment prices during the same period was only 75 pct, however. Other price boosts since 1939: Iron and steel products, 111 pct; nonferrous metals, 131 pct; fuel and power 80 pct; construction costs, 190 pct.

**Navy Sells Scrap** . . . Copper scrap generated by the Navy will be sold by bid call, as the service resumes normal disposal activities. Since September, 1951, the Navy had been making copper and copper-base alloy scrap available to Naval contractors who needed the material for defense work. While this program was in effect, more than 53 million lb of copper and alloy scrap was refined by defense contractors or under toll arrangement.

**Increase Capacity** . . . Tennessee Coal & Iron Div., U. S. Steel Corp., plans to increase capacity of its Fairfield, Ala., tin mill by 160,000 tons per year. TC&I received a certificate of necessity for $8.5 million, 40 pct allowed, to carry out the expansion.

## Prices At A Glance

*(cents per lb unless otherwise noted)*

| Composite Prices | This Week | Last Week | Month Ago | Year Ago |
|---|---|---|---|---|
| Finished Steel, base | 4.634 | 4.634 | 4.634 | 4.376 |
| Pig Iron (gross ton) | $56.59 | $56.59 | $56.76 | $55.26 |
| Scrap, No. 1 hvy. (gross ton) | $31.50 | $35.33 | $40.00 | $42.00 |
| **Nonferrous Metals** | | | | |
| Aluminum, ingot | 21.50 | 21.50 | 21.50 | 20.00 |
| Copper, electrolytic | 29.50 | 29.50 | 29.50 | 24.50 |
| Lead, St. Louis | 13.30 | 13.30 | 13.80 | 15.80 |
| Magnesium, ingot | 27.00 | 27.00 | 27.00 | 24.50 |
| Nickel, electrolytic | 63.08 | 63.08 | 63.08 | 59.58 |
| Tin, Straits, N. Y. | 81.75 | 82.50 | 83.50 | $1.21⅜ |
| Zinc, E. St. Louis | 10.00 | 10.00 | 11.00 | 13.75 |

# Argue Merits of Sliding Tariff

**Proponents of variable duty claim fixed rate is no help when prices are abnormally low . . . Others feel sliding-scale would foster price instability—By *R. L. Hatschek.***

Industrial dissension continues over the best medicine to cure the ailing lead and zinc mining industry in the U. S. Last week, at the convention of the American Mining Congress in Seattle, the sliding scale tariff proposal was batted around some more.

President Andrew Fletcher of St. Joseph Lead Co. backed the variable tariff to the hilt, claiming that huge imports have done considerable harm to the domestic miners. He stated that some relief could be obtained under the escape clause of the Reciprocal Trade Agreements.

**Against Fixed Duty . . .** These would permit an increase in tariffs to 50 pct above the Jan. 1, 1945, rate. Maximums allowed would come to 2.55¢ per lb on metallic lead, 1.80¢ for lead in ores and concentrates, 2.10¢ for metallic zinc and 1.80¢ for zinc content of ores and concentrates.

But, Mr. Fletcher contends, a fixed tariff rate gives little protection when prices fall to abnormally low levels and the tendency is to increase domestic prices when demand is high.

**"No" to Sliding Tariff . . .** Opposite view was taken by Jean Vuillequez, vice-president of American Metal Co., who maintains that sliding scale tariffs would encourage price instability. He stated further that high cost mines would not benefit and foreign mines would suffer.

His feeling is that government subsidies and a stable government stockpiling program are the right answer. According to Mr. Vuillequez, tariff discussions would not be necessary if the government hadn't dropped stockpiling after buying with what seemed an "insatiable appetite."

**Markets Quiet . . .** Lead demand was light toward the end of last week following fairly good sales. The trade expects a pickup this week as consumers enter the market for October tonnages.

Activity in zinc was listless and the large majority of transactions that were made during the week were on an average price basis rather than the official 10¢ per lb. American Zinc, Lead & Smelting Co. has trimmed its work week to 5 days at the Grandview Mine in Washington. Other mining firms in northeastern Washington and Idaho say they are considering similar cuts.

**Growing Up . . .** The already-giant aluminum industry last week showed a new sign of maturity. The Aluminum Assn. has revised and expanded its monthly statistical reports. Figures are more comprehensive and broken down into a more detailed picture of the industry.

Primary production for July totaled 109,285 tons, a new alltime record, as compared to 104,152 tons in the preceding month. Other July shipments, in net tons, were:

| | |
|---|---|
| Sheet and Plate, total | 53,619 |
| Non-Heat-Treatable | 40,897 |
| Heat-Treatable | 12,722 |
| Foil | 4,703 |
| Extruded Products, total | 13,148 |
| Alloys 2S, 3S, 52S, 61S, 63S | 8,632 |
| All Other Alloys | 4,516 |
| Castings, total | 12,352 |
| Sand | 1,748 |
| Permanent Mold | 5,271 |
| Die | 5,333 |
| Tube, Drawn and Welded, total | 2,383 |
| Alloys 2S, 3S, 52S, 61S, 63S | 1,804 |
| All Other Alloys | 579 |
| Rod and Bar, Rolled and Drawn | 9,277 |
| Wire, Bare, Other than Conductor | 1,513 |
| Electric Conductor, Bare (Aluminum Content Only) | 5,033 |
| Forgings | 2,224 |
| Miscellaneous Products | 1,113 |

**Tin Afloat . . .** First 1000-ton shipment left South America last week under the 10,000-ton tin purchase agreement with Bolivia. Details of the deal were not made public immediately, but it is understood that the purchase price will be computed from the average of the New York spot price and the 3-month future price on a monthly basis.

There was little if any haggling on terms. Reason is that the U. S. is buying, not because of any need, but mainly to help Bolivia dispose of a surplus.

**Shipments Stay Down . . .** Brass and bronze ingot shipments in August showed no real rebound, topping vacation-riddled July by only 835 tons. Total was 20,156 tons as compared to 19,321 tons in July and 20,818 tons in June. Total for the first 8 months of the year is 185,107 tons against 182,731 tons for the same period last year.

The copper market remains quiet with business running on the light side and prices steady at 29¢ to 30¢ per lb. All eyes are on Washington where negotiators for the State Dept. and the Chilean Government are trying to work out an agreement.

## NONFERROUS METAL PRICES

*(Cents per lb except as noted)*

| | Sept. 23 | Sept. 24 | Sept. 25 | Sept. 26 | Sept. 28 | Sept. 29 |
|---|---|---|---|---|---|---|
| Copper, electro, Conn. | 29.00–30.00 | 29.00–30.00 | 29.00–30.00 | 29.00–30.00 | 29.00–30.00 | 29.00–30.00 |
| Copper, Lake delivered | 30.125 | 30.125 | 30.125 | 30.125 | 30.125 | 30.125 |
| Tin, Straits, New York | 83.75 | 82.50 | 81.50 | .... | 81.75 | 81.75* |
| Zinc, East St. Louis | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Lead, St. Louis | 13.30 | 13.30 | 13.30 | 13.30 | 13.30 | 13.30 |

Note: Quotations are going prices
*Tentative

# Chapman Casts World's Largest Stainless Gate Valve

## 9-ton casting produced in austenitic chromium-nickel stainless steel

This valve, produced by The Chapman Valve Manufacturing Co., Indian Orchard, Mass., for the defense effort, is used in corrosive water service. It is stated to be the world's largest, with an overall height of 19 feet, weighing approximately 18,000 pounds. The rough casting weight was approximately 36,000 pounds.

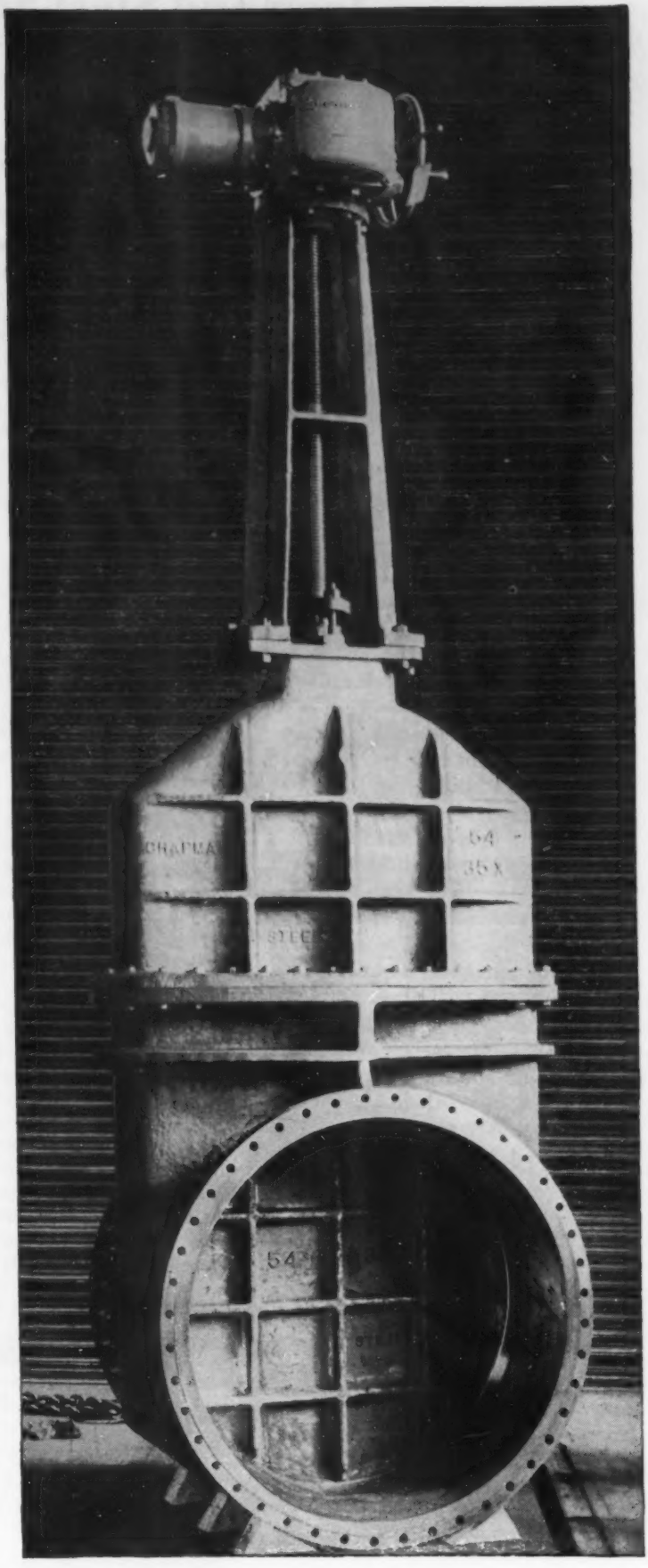
Cast in low carbon 18-8 chromium-nickel stainless steel, it is one more demonstration that size is no limiting factor when you cast parts in stainless steels to provide resistance to corrosion and erosion.

Stainless steel resists attack by nearly all oxidizing acid conditions. In addition, it helps you trim bulk and deadweight without sacrificing strength and safety.

At elevated temperatures, austenitic chromium-nickel stainless steels are distinguished by their strength and outstanding resistance to oxidation. At temperatures down to −320° F. they retain their toughness and unusual strength.

Investigate all the benefits stainless steels can give you. Leading stainless steel companies and foundries produce nickel-containing stainless steels in all commercial forms. A list of sources of supply will be furnished on request.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to the appropriate authorities, nickel is obtainable for the production of austenitic stainless steels for many end uses in defense and defense supporting industries.



**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET NEW YORK 5, N. Y.

# 'How Could Market Come Down So Fast?'

**Even veteran scrap traders are startled by sheer drop of market . . . Could not collect large tonnages at current prices . . . Renewed talk heard of need for scrap exports.**

Continuing downfall of the scrap market is startling even veteran scrap traders who do not see how it could come down so fast. Genuine distress signals are flying; tempers are getting short.

A certain amount of resistance to the sheer drop is developing and many scrap men say they could not collect substantial quantities of scrap at "rock-bottom" prices. Of course, with scrap purchasers playing it coy there is no reason at this time to collect large tonnages of metallics.

Although "trickle" orders are filled at current low prices, scrap traders insist that once mills are forced into the market by need, prices will firm up suddenly. No one believes they will stabilize at high levels. The era for that seems departed.

What is happening now is drying up of marginal scrap sources and temporary withdrawal of some regular ones. The marginal ones will probably never recover—barring a war shortage.

Renewed talk is heard about the right to export scrap—a move so far denied by Washington. Exports, if permitted on a large scale, could counteract buying lethargy at home—probably bring buying out of hiding.

**Pittsburgh**—Scrap prices dropped sharply this week with secondary openhearth grades off $6 per ton and the balance of the list off in sympathy. A purchase by a large consumer established a price of $28 for No. 2 steel and $26 for No. 2 bundles. Short turnings were bought for $24, off $4 per ton. Consensus is that the order will serve as a good test of the market. Some dealers reportedly are upset at suddenness of the decline. But there was little doubt the order will be filled without difficulty.

**Chicago** — Chicago's scrap market staggered last week as steelmaking scrap prices plummeted. A break had been expected, and offers of $3 under market for fair tonnages had been rumored, but the extent of the slide caught most scrap people flat-footed. An offer of $30 on RR steel had been reported, but wasn't attracting takers at press time.

**Philadelphia**—Definite resistance to latest low prices is being felt. Dealers and brokers alike call this the bottom, a rebound point. While orders are scarce, business placed last week pegs No. 2 steel at $27 and No. 2 bundles at $25. Other steelmaking grades are off in sympathy. Blast furnace material is also off on the basis of a sale.

**New York**—"A big, fat question mark with a pessimistic look," is what one local broker termed today's scrap market. Resistance of the trade is developing with the latest steep reductions in prices. At these levels, dealers say they'll pile scrap and see who can wait the longest.

**Detroit**—Steelmaking grades went into another tailspin following closing of industrial lists. Trade had talked of a top price for prime automotive bundles of $31 and hit it on the head. Other prices were lower. Although automotive tonnages were down, little market for dealer bundles is expected for at least another month. Machine shop turnings are going to crushers, the only possible outlet.

**Birmingham** — The biggest steel scrap buyer in the district was back in the market this week with a fair-sized order divided among several brokers in the district at an advance of $2 per ton for No. 2 steel and No. 2 bundles. Brokers were confused by reports from Pittsburgh that one corporation had drastically slashed prices of these grades.

**Cincinnati** — Steelmaking grades slipped at least $4 here on appraisal as sympathetic waves of weakness washed in from other areas. Local buying is still at a standstill. Many scrap men are using water freight in futile attempts to come up with a price that isn't nominal. There may be limited October buying in an adjoining area, but movement of any significant local tonnage is considered doubtful.

**St. Louis**—Following the pattern of other markets, scrap here declined sharply again this week. A few sales were made of No. 2 heavy melting steel, but from stocks on hand which are said to be limited. Dealers say it is impossible to buy replacement scrap at present price levels, with higher labor and trucking costs. A list of 70 carloads of railroad scrap went to a Kansas City consumer, and a 6000-ton order of turnings was going at $13.

**Cleveland** — Valley sales of No. 2 steel at $28 and No. 2 bundles at $26 have driven the market on No. 1 grades down $4 in Youngstown and $3 in Cleveland. Real trouble is anticipated in filling orders at current prices. Many predict that scrap will dry up as dealers languish at the break-even point. Market forecasters in this area wouldn't be surprised to see fall dryness followed by an upward price trend on winter tonnages.

**Boston**—The New England market has continued to fall apart in the past week. Most heard comment in the trade is: "How can it go much farther?" Steelmaking grades are off as much as $2 and some blast furnace and cast iron grades also dropped. Very little activity is to be found in openhearth material and foundry scrap is dormant.

**Buffalo**—Plunging tendencies again rule the scrap market here as steelmaking and blast furnace grades broke $3 to $5 more. Railroad and cast items are nominally unchanged and cast was traded recently within current levels. Two leading mill consumers continue an embargo on shipments while a third mill is also out of market. Due to a clerical error last week's machine shop turnings were misquoted. Correct price was $19.50 to $20.50.

**West Coast**—Market continued very sluggish with new price drops of up to $4 and reduced tonnage for October. The cast market in San Francisco area is very soft due to strike in a major pipe-making firm.

ELECTRIC FURNACE

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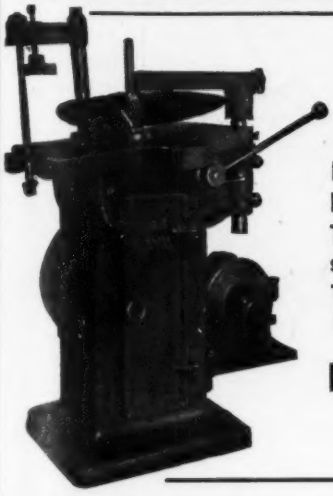

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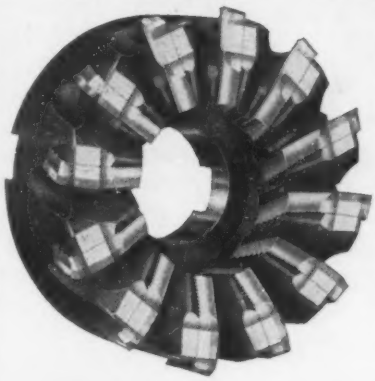

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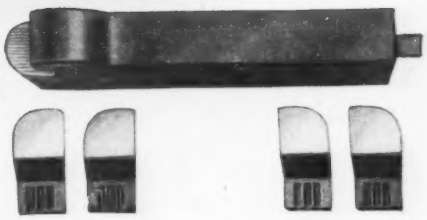

A

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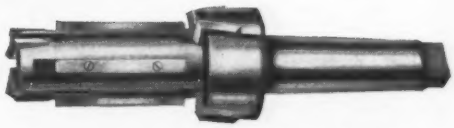
B



(A) END MILL. (B) COMBINATION BORING AND FACING MILL. Both are made with tapered, serrated blades adjustable to hold diameters. (C) ALTERNATE ANGLE CUTTER. Slots all widths 1/2" and over, and all diameters 4" and larger. Blades of H. S. Steel, Super Cobalt, Stellite or Carbide Tipped.

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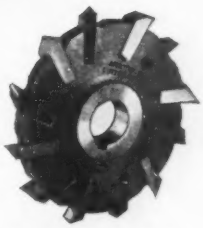

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27" x 12' centers LODGE & SHIPLEY Selective Geared Head Lathe, AC-MD
28" x 15' centers BERTRAM (Niles patterns) Timesaver Engine Lathe, 2 carriages, rapid traverse, AC-MD, 1943
36" x 12' centers AMERICAN Heavy Duty 16 Speed Geared Head Lathe, AC-MD
42" x 96" centers NILES Timesaver Heavy Duty Lathe, 42" swing over ways, rapid traverse, anti-friction head, AC-MD
60" x 20' NILES BEMENT POND Geared Head Engine Lathe, rapid traverse
No. 5 BARDONS & OLIVER Turret Lathe, bar feed, preselector head, new 1943
No. 5 GISHOLT Ram Type Turret Lathe, preselector head, new 1943
No. 1L GISHOLT Turret Lathe, preselector head, bar feed, tooling, new 1943
No. 1A WARNER & SWASEY Universal Turret Lathe, Timken spindle, electric chuck
No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943
No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling
3¾" bar LUCAS Table Type Horizontal Boring Mill, vertical milling attachment
No. 2 CINCINNATI Vertical Mill, dial type, new 1945
No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD
No. 4 KEARNEY & TRECKER Plain Horizontal Mill, No. 50 taper, motor in base, rapid traverse
No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, new 1943
No. 4H KEARNEY & TRECKER Vertical Mill, new 1944
14" x 120" NORTON Cylindrical Grinder, self-contained, AC-MD
No. 16 BLANCHARD Rotary Surface Grinder, 26" magnetic chuck, AC-MD
25A HEALD Rotary Surface Grinder, 24" diameter magnetic chuck, AC-MD
1½" LANDIS Bolt Threader, leadscrews, AC-MD
75 Ton HENRY & WRIGHT Double Crank Dieing Machine, roll feed & scrap cutter
600 Ton CHAMBERSBURG Wheel Press, cast steel frame, inclined, AC-MD
30" MORTON, Hydraulic Keyseater, new 1942
48" x 48" x 12' NILES Double Housing Planer, 2 rail heads, 1 side head, power rapid traverse
48" widened to 69" x 12' DETRICK & HARVEY Double Housing Planer, box table, DC reversing motor drive

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MACHINERY CO.
of BUFFALO, n. y.
1693 GENESEE ST.

# The Clearing House

**NEWS OF USED AND REBUILT MACHINERY**

**Hasn't Meant Much . . .** Up to now, the anticipated windfall of replacement business from the Detroit Transmission fire hasn't materialized, and chances are it won't. This fact has only added to the customary gloom that prevails among Michigan used and rebuilt machinery dealers.

They had expected that some good business would stem from the fire, but, with exceptions, it generally hasn't worked out that way.

Shortly after the fire there was a slight rush of what might be called panic buying with the emphasis on automatics. Some used Bullards were purchased and some mills. But this didn't last long, and General Motors' quickly formulated plans didn't include much in the line of used machinery.

**Turned Down Jobs . . .** Most of the machinery needing repair was sent back to the original manufacturers and other GM divisions. In cases where machinery was returned to the manufacturer, an additional order for new machine tools was frequently placed.

In view of the critical emergency it would seem that GM might have gobbled up a lot of used machinery. Reason it didn't is that GM wanted new machinery and through its vast resources was able to line up what it needed.

Machine tools on order by other divisions were shunted to the Detroit Transmission retooling program. Machinery that could be spared elsewhere in the corporation was offered, as was machinery that might normally have gone into the used market.

**Still Hoping . . .** Some of the used machinery and rebuilding trade is still hopeful that GM will need help, particularly if the repair and rebuilding of fire-damaged machinery doesn't go through on schedule. But even if this belated business does develop, it won't be in any great quantities.

Among those who did get a substantial amount of fire business are rebuilders and repairers of electric motors and transformers. Actually, the volume of this business was not enough to overload any of these repair facilities, but almost every plant or shop in the area has had some GM work.

Orders for electrical repair work have not always come directly from the burned out plant. More frequently the source has been another supplier such as a machine tool builder who farmed out the electrical work. Much of it was cleaning and rewinding.

**Spread Thin . . .** Taken altogether, this work has amounted to a sizable amount of business, but it has been spread so thinly that its impact has not been heavy.

Used machinery market has not been too encouraging for most Detroit dealers. Toolroom business has stayed reasonably good, but production machinery is off. The trade, traditionally pessimistic, may be overdoing it somewhat, but business is off and the future holds little promise.

**Use TV . . .** Chicago's Interstate Machinery Co. is planning to use closed circuit television at its machinery fair in October. Object is to bring on-the-spot pictures of rebuilding operations in distant shops to a central location so that visitors can get the benefit of a complete plant tour without leaving one central area.

As it did last year, Interstate will arrange industrial clinics on machine operations.

Another indication of the aggressiveness of Chicago used machinery dealers is the fact that at least one firm is investigating the sales potentialities of painting machines different colors. Sales pitch is that some colors produce less eye fatigue under incandescent light, while others are better for work under fluorescent lighting.